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Viking Lander Atlas of Mars

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To Tim Mutch ... explorer

PREFACE

The 1976 Viking scientific exploratory mission to Mars successfully placed two identical spacecraft in orbit and two identical landers on the surface of the planet. This report presents half-size reproductions of the extensive sets of systematic map products that have been generated for the two Mars Viking landing sites from stereo pairs of images radioed back to Earth from the landers. These maps span from the immediate foreground to the remote limits of ranging capability, several hundred meters from the spacecraft. The maps are of two kinds: 1) elevation contour, and 2) vertical profile.

The report is written with the following aims in mind: 1) To provide, in convenient form, relatively inexpensive reduced-size reproductions of the complete set of nearly 200 true-scaled maps, in the expectation that the reduced-size versions will suffice for certain requirements. 2) To describe the maps, and discuss their unorthodox appearance that results principally from the positions of the cameras relative to the Martian surface. 3)To make available an organized version of the complete set of maps that will enable a convenient means of identifying the individual sheets for which true-scale copies might be desired. 4) To provide a companion resource to collections of true-scale sheets, from which one may index into the true-scale collection. Individual copies of the true-scale maps are available from the National Space Science Data Center.

This report is divided into three parts, and a set of appendices: Part I contains background and explanatory material important for understanding and utilizing the map collections; less essential material is deferred to appendicies at the end of the report. Part II contains the collection of lander 1 maps. Part III contains the collection for lander 2.

ACKNOWLEDGMENTS

There is a lengthy history to the production of the maps contained in this report. The Stanford Stereo System, especially constructed for the creation of maps from digital images of the surface of Mars, has been previously described [Liebes, 1977]. The many individuals who contributed directly to the development and support of that system are noted in the earlier report. I wish particularly to single out, however, the contribution made both to the success of the stereo system and to the creation of the map data by Arnold A. Schwartz, then of the Image Processing Laboratory, Jet Propulsion Laboratory, Pasadena, CA. Arnie wrote all of the substantial computer code that supported the stereo mapping system, and subsequently spent countless hours commanding the computer while the stereophotogrammetry of the Martian surface was being performed. Joseph W. Berry, then also at the Image Processing Lab at JPL, good naturedly provided relief to Arnie during a portion of the map production. All of the stereophotogrammetry for the systematic maps was performed by the author.

The range data sets, which are the prime photogrammetric product, represent the spatial location of each of the recorded points on every contour or vertical profile by their three-dimensional position in a spacecraft specific system of coordinates. After the creation of these range data sets, at the JPL Image Processing Laboratory, magnetic tapes of the sets were transported to Stanford University, were the laborious tasks of writing code to read the sets, designing the format for the map products, and executing the extensive production activity was undertaken.

Two individuals played a particularly key role in the tasks of program design, implementation and execution, and in the production of the map masters at Stanford. In this regard, I wish to note the exceptional contribution made by Stuart McDonald, largely while he was an undergraduate student in computer science at the University of California at Berkeley. Stuart spent the summer of 1979 designing and implementing the code that enabled us to trace through the range data sets, and implementing most of the code for the formatting of the contour maps. His work was creative, efficient, meticulous and dedicated. John C. Gilbert, then a masters student in computer science at Stanford, adapted Stuart's code to the processing of the vertical profiles and implemented the format for the the plotting of these sheets. This was an extensive task in itself, and John executed this task with the greatest of skill and dedication. A Stanford freshman, Ernest Adams, provided not only valuable assistance in elements of the general code work, but additionally did much of the adaption of Stuart's code for the reading of mosaic line and sample values out of the range data sets and formatting of the camera perspectives of the contour maps that are included as a part of the collection of map products.

Hans Moravec, then a PhD graduate student in computer science at Stanford, provide invaluable assistance to us, initially in writing code to enable us to read the IBM formatted range data sets on our DEC PDP-10 computer, and subsequently in educating us to the use of his computer graphics and character font routines on the Varian electrostatic plotter employed in the production of the map masters. I am deeply greatful to Robert Tucker, of the Stanford Medical School SUMEX computer staff, for his skilled and generous assistance to us in reformatting the magnetic tape data, as received from the Jet Propulsion Laboratory, so that it could be read and transmitted between DEC computer systems at Stanford.

Dr. Henry J. Moore, of the U.S. Geological Survey, Menlo Park, CA served as a member of the physical properties team for the Viking lander. Hank meticulously made visual measurements of camera pixel positions for conjugate points in stereo image pairs and performed extensive hand calculations of 3-D field point coordinates, both to support his own research interests and to help check the performance of the Stanford Stereo System. Hank has additionally conducted spot checks of the systematic elevation contour maps for both landers. Hank's invaluable collaboration is deeply appreciated.

And finally, I wish to acknowledge my deep appreciation to Prof. Elliott C. Levinthal of Stanford University for his colleagueship and support during the Viking years, and for his general supervision of the production of the Viking lander camera mosaics that constituted the input imagery for the photogrammetric processing that is the subject of this report.

Support for the production of these maps from the previously generated computer readable range data sets was provided under contracts NAS1-9682 and JPL-955249, and grants NSG-7538 and NAGW-128 (Mars Data Analysis Program).

CONTENTS

1. INTRODUCTION

1.1 The Viking Mission

The Viking Mission launched two unmanned spacecraft toward Mars in the summer of 1975, for the purpose of scientific exploration. Each craft consisted of an orbiter and a lander. The craft accomplished Mars orbital insertion seven weeks apart in the summer of 1976. The landing site certification processes resulted in revision of the preselected landing sites for both landers. Useful points of entry into the earlier scientific literature on the mission are the special issue of the *Journal of Geophysical Research,* vol 82, Sept. 30, 1977, and vol 84, Dec. 30, 1979. The reader interested in the dramatic accomplishments of the flight phase of the mission — especially the remarkable human and engineering achievements involved in solving problems that arose — is referred to the paper of Martin and Young [Martin, 1976].

1.2 Lander Locations

The areographic coordinate [de Vaucouleurs, 1973] locations for the Viking landers have been established to be as follows [Davies, 1978; Morris, 1980]:

Viking lander 1: lat 22.483° N., long 47.968° W.
Viking lander 2: lat 47.966° N., long 225.736° W.

1.3 Lander Cameras

Among the complement of equipment on each lander were a pair of identical panoramic cameras [Patterson, 1977]. These cameras enabled extensive stereoscopic imaging of the landing sites. The camera was a point scanning device capable of acquiring data from 40° above the horizon to 60° below, through nearly 360° of azimuth. The camera was configured about a vertical optical axis. A photosensor array, consisting of a tightly clustered set of 12 light-sensitive silicon photodiodes, was located in the focal region below the lens. The diode aperatures were of two sizes, corresponding to angular resolutions of 0.12° and 0.04°. Four of these were "high resolution" 0.04° broad band (black and white) diodes, each stepped at a slightly different focal distance from the lens. Virtually all of the imaging data used for mapping purposes was aquired at 0.04° resolution. The choice of diode was dictated by the range span of the section of the landscape to be imaged.

Mounted in the object space immediately above the lens was a mirror, with a capability to nod about a horizontal axis. This mirror enabled the Martian landscape to be imaged upon the photosensor array. In the standard mode of operation, the mirror nodded five times per second. As the image of the scene was swept across the photosensor array, the diode selected to be active would sample the image 512 times, at angular spacings equal to the diode resolution. Each of the sampled light intensity levels was digitized at 6 bits, corresponding to 64 shades of gray. At the end of a downward scan through the scene, the entire camera would rotate one angular resolution element about the vertical axis, and the process would be repeated for the next scan line. In this manner, in the high resolution 0.04°-mode, an approximately 20° vertical acquisition would be achieved. The vertical acquisition window could be commanded to image centers at 10° vertical intervals. The start and stop azimuth positions for the rotation of the camera about the vertical axis were under command control. Adjustable offset and gain controls could be set for brightness and contrast conditions. The images were radioed back to Earth either directly from the lander, or more commonly via a relay link through the more powerful transmitter of the orbiter.

The camera photogrammetric reference points were located approximately 0.82 m apart at equal heights above the lander deck, and at 1.3 m above the nominal landing plane. In the course of the mission, practically all of the visible panorama was imaged in high resolution at different times of day by both cameras of both landers. Thereby, virtually all of the scene that was visible in common to both cameras was imaged stereoscopically.

2. MAPPING THE MARTIAN SURFACE

2.1 The Stereo Mapping System

A versatile stereoscopic mapping system was developed jointly by Stanford University and the Jet Propulsion Laboratory [Liebes, 1977] to support the lander cameras. This system enabled the prompt generation of precise topographic maps in support of mission critical acquisition of surface sample material for the several miniature laboratories on board the landers. It additionally supported use of the sampler arm for Martian surface physical properties experiments [Moore, 1978]. When pressure abated to deliver map products in support of sample arm activities, a systematic mapping was undertaken of the entire stereoscopically imaged landing sites, from the immediate foreground to the remote limits of ranging capability, over 100 m from the landers.

The ranging and mapping system consisted of the Stanford Stereo Station, a computer, image display hardware, and a substantial computer program, RANGER. The Stanford Stereo Station supported a pair of video monitors arranged so that they could be viewed through a panning stereoscope. Computer resident digital stereo imaging data could be called forth for display upon the video monitors. A photogrammetrist, peering into the stereoscope, perceived a 3-D model of the Martian relief. The computer could be commanded to project upon the monitors an artificial 3-space mark, consisting of a pair of appropriately coupled video dot overlay cursors. The photogrammetrist, stereoscopically viewing the displayed images, could employ a hand-input device in the form of a trackball to move the 3-D cursor through the space of the visualized stereoscopic model. The cursor could be constrained to arbitrary mathematical surfaces in the model. The systematic maps contained within this report were generated by commanding the computer to constrain the 3-space mark to to a selected member of a set of horizontal or vertical surfaces, for the purpose of enabling the generation of elevation contours or vertical profiles, respectively. The task of the photogrammetrist then became the traditional one of moving the mark along his perception of the intersection of the mathematical surface of constraint with the Martian relief. In this manner, digitized versions of the contours or profiles of any desired kind could be generated and stored. The fundamental system product was a computer readable and plottable, range data set (RDS). The RDS represented contour and vertical profile lines as sequences of 3-D points. The record for each point consisted of its three spatial coordinates, plus the corresponding scan line and sample values associated with the image locations in each of the images — a set of seven values. Secondary products included maps, stereo projections of maps, and image mosaics overlayed with contours and profiles.

2.2 Input Images to the Stereo System

The stereo mapping system was designed to operate on images from arbitrary sources, exhibiting arbitrary mappings between recording systems and data storage formats. In particular it could operate, for the Viking lander, upon either raw geometrically untransformed images, taken with any of the photodiodes, or upon high resolution computer assembled mosaics, constructed from images taken at three different times of day — morning, mid-day and evening [Levinthal, 1980]. All of the sampler arm support work was performed with raw, geometrically untransformed images. The mosaics served as the input images to the stereo mapping system for the generation of the systematic maps. These mosaics were compiled from numerous raw images acquired with each of the four high resolution diodes. Each elemental input image was geometrically transformed to compensate for diode-specific geometric calibration characteristics prior to incorporation into a mosiac [Wolf, 1981]. The initial mosaics used in the generation of the systematic map data manifested lander tilt, evidenced by a the sinuous warp of the horizon. Later, all mosaics were transformed to the "detilted" form they would have exhibited if the camera were rotated about its photogrammetric reference point so as to remove the rotation induced by lander tilt. The stereo system could operate equally well on both "tilted" or "detilted" mosaics, and indeed both were used, according to availability, in generating the systematic RDSs. All of the mosaics presented later in this report are of the "detilted" form.

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3. EXPLANATION OF MAPS

3.1 Systematic Map Types

Two different types of comprehensive systematic maps were developed:

Elevation Contours: Systematic contour map data, consisting of intersections with the surface of Mars of planes oriented perpendicular to the local gravity vector. These extend from the immediate foreground to the remote limits of ranging capability, in excess of 100 m range, for the front and back of both landers.

Vertical Profiles: Systematic vertical profiles, consisting of intersections with the surface of Mars of planes radiating out from the lander and containing the local gravity vector. These are generated at 5°-azimuth intervals, from the immediate foreground to the remote limits of ranging capability, for the front and back of both landers.

3.2 General Comment

The systematic map data, derived as it is from two cameras located approximately 0.82 m apart and roughly 1.3 m above the nominal Martian surface, is of a quite unorthodox character. The stereo ranging accuracy is approximately quadratically dependent upon range, with absolute single point ranging accuracy varying from approximately ± 1 cm near the lander to roughly ± 20 m at 100 m range , with rapid deterioration beyond (see Appendix D; also [Liebes, 1977]). Relative accuracy of the data, out to a few tens of meters, is estimated to be an order of magnitude better than the absolute accuracy.

Given that the ranging accuracy of the map data is highly range dependent, it was adopted as a production policy for the elevation contour maps that the complement of scales should be such that somewhere within the map collection there should appear a sheet upon which any contour segment could be examined with the full level of meaningful resolution. This policy was partially relaxed for the vertical profiles.

Though the operation of the mapping system and the production of RDSs could, in principle, be accomplished by a single individual, in practise it invariably involved two people, one to command the computer and the other to perform the stereophotogrammetry. Efficient operation required knowledge both of the program RANGER and the operating system. It was not infrequent that problems of one sort or another related to either the program or the support system would arise. Furthermore, the photogrammetrist was kept busy generating cartographic data, making judgements about where to go next, be it to continue a line or profile, to window to different portions of the images, etc.

3.2.1 Maps and Support Products

Several products have been prepared to aid in the interpretation of the maps. In order to enable the reader to associate the lines of the contour and vertical profile maps with the corresponding physical features on Mars, there are included at the beginning of each collection of maps reproductions of the stereo pairs of computer assembled mosaics used to generate the maps. These mosaics exhibit overlays of the entire set of elevation contour or vertical profile lines. As the perspective of the contour maps is orthographic from above, the perspective of the vertical profile plots is normal to the individual profile planes, and the perspective of the cameras is oblique from the surface, a little practise will be required to make the association between corresponding lines in the maps and mosaic overlays. The map overlay lines on the mosaics are not annotated with either elevation or azimuth values. However, companion products have been included along with the mosaics. They consist of a reprojections of the map data as they would appear to camera number 1, the left hand of the two cameras (looking outward from the front of the lander). The lines in the reprojections are labeled in one instance with the contour-elevation and in the other with profile-azimuth values. Since these "camera perspective" representations of the annotated lines have the same projective appearance as the mosaic overlays, one may readily determine the parameter values of lines in the overlay images.

3.3 Elevation Contour Maps

Each of the elevation contour map grids is standardized to a 50-cm-square frame (true-scale), corresponding to a 25-cm-square frame in the half-size reproductions contained in this report. The contour map production policy lead to the generation of single sheets for the larger scale numbers. However, multiple sheets were required for the smaller scale numbers. The number of sheets required for each of the landers differed, due to variations in landing site topography and lander tilt. There are 64 elevation contour sheets for lander 1 and 66 for lander 2.

The coordinate system of the maps is the Local Gravity-Normal (LGN) system. The LGN system is orthogonal and right-handed. The LGN z-axis is directed vertically upward toward the local Martian zenith. The LGN x- and y-axes are horizontal. The origin is approximately 28 cm below the nominal landing surface, at a point approximately centrally located beneath the lander. The LGN x-axis is directed horizontally to the right on the maps. The intercamera baseline is nearly parallel to the LGN x-axis. The LGN y-axis is directed upward on the sheets, and points approximately forward from the lander. The LGN origin coincides with that of the Lander Aligned Coodinate System (LACS). Further details regarding coordinate systems are presented in Appendix A.

The production policy lead to the creation of elevation contour maps at eleven different scales: 1:1, 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000, and 1:2000. The number of sheets required at any given scale is variable. For each scale the sheet complement is a contiguous, non-overlapping array.

Only single sheets were produced at the larger scale numbers, and for these the lander has been "sheet-centered," that is, located in the center of the sheet. Multiple sheets have been produced for the smaller scale numbers, and for these sheets the lander is "sheet-cornered," that is, located at the mutual corners of a real or virtual subset quadruple of the complement of sheets.

Figure 1 illustrates an example of an elevation contour map sheet. Immediately below the Viking lander number, at bottom center, the scale and a sheet array designator are indicated. The scale is valid for the true-scale sheets. Since the sample sheet

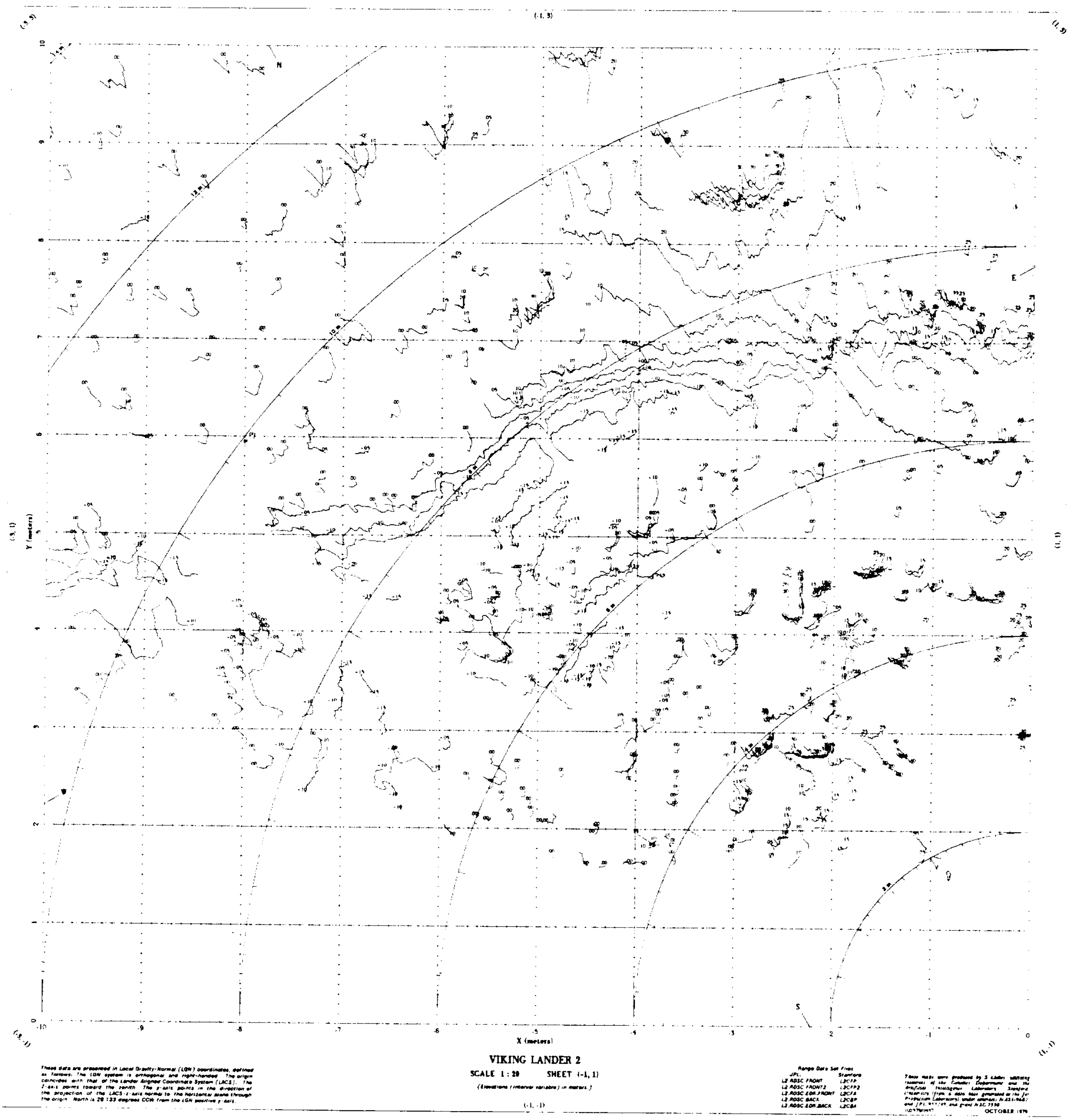

Fig. 1. Example of an elevation contour map sheet.

is indicated to be "SCALE 1:20," the actual scale of the sample sheet, reproduced here at half-size, is 1:40.

The sheet array designator consists of a number pair enclosed in parentheses, e.g. "SHEET $(-1, 1)$." This designator indicates at sheet scale the position of the sheet center, relative to the lander, in units of half-sheet dimensions. The first member of the designator number pair is equal to the number of half-sheet dimensions that the subject sheet center is displaced in the LGN x-direction, i.e. to the right of the lander; the second number of the pair is equal to the number of half-sheet dimensions that the subject sheet center is displaced in the LGN y-direction, that is forward from the lander. A sign reversal designates a displacement in the opposite direction. This scheme leads to designators composed of odd number pairs if the lander is sheet-cornered for the set, and to designators composed of even number pairs if the set is characterized by sheet-center lander placement. Thus, e.g., in the case of the larger scale numbers, where only a single sheet is produced, the lander is centered on the sheet, and the sheet designator is (0,0). The designator for the sample sheet is $(-1, 1)$. The "-1"indicates that the center of the sheet is one half-sheet dimension to the left of the lander and the "+1" indicates that it is one half-sheet dimension in front of the lander. Thus, for this sheet the lander is located at the lower right corner of the the sheet; the lander is "sheet-cornered" for this set of sheets. As the front of the lander faces toward the top edge of the sheet, i.e., in the positive LGN y-direction, and the intercamera baseline is nearly parallel to the LGN x-axis, camera 1 is located at $x_{LGN} \approx -0.41$ m, $y_{LGN} \approx 0$ m, and camera 2 is located at $x_{LGN} \approx +0.41$ m, $y_{LGN} \approx 0$ m).

The block of information in the lower left corner of the sheet describes the coordinate system of the maps — the LGN system — and indicates the direction of north relative to that system.

The block of information to the right of the sheet designator lists the names of the range data set files from which the maps have been derived. As the naming convention is different at Stanford from that at JPL, both sets of file names have been indicated. The file names for all the RDSs used in generating the contour and vertical profile maps for both landers are listed in sect. 3 of Appendix C.

As all sheets are standardized to a 50 cm grid boundary (true-scale), a standard interior grid pattern has been adopted. Grid lines are at 5 cm (true-scale) spacing, and grid ticks at 5 mm (true-scale) intervals. The absolute significance of these marks is of course determined by the scale.

The sheet exhibits a set of arcs (or circles) concentric with the lander, at 10-sheet-cm (true-scale) intervals in radius, and each labeled with the associated horizontal range from the lander. The arcs also bear a circumferential indexing pattern that denotes the directions of the systematic vertical profiles that have been generated at 5°-azimuth intervals around the lander. The azimuthal fiducial marks have not been labeled. To have done so would have unnecessarily cluttered the often already busy sheets, and would risk overwriting elevation values. The indexing pattern makes it easy to establish the azimuth values. The marks at positions that are integral multiples of 15° have enhanced length relative to the intermediate pairs of 5° marks.

Elevation values for the contour lines are indicated in meters, relative to the LGN origin. These values are equal to the LGN z-coordinate associated with the contouring plane. The cardinal points of the compass are indicated on the inner margin of the grid frame; these are relative to a compass rose origin located at the center of the sheet.

At the sides and corners of the sheets will be found pointers to the sheet designators for the neighboring sheets. The pointers are present regardless of whether or not the particular neighbor has been created.

A tabulation, immediately preceding the collection of elevation contour sheets indicates both the complement of sheets that have been generated for each of the scales, and the page numbers upon which the individual sheets may be found.

3.3.1 Idiosyncrasies of the Contour Maps

The contour maps, generated as they are from surface based cameras located approximately 0.82 m apart and approximately 1.3 m above the Martian surface, exhibit several unorthodox characteristics that bear comment:

1) Of course, only those portions of the scene that can viewed by both cameras can be stereoscopically mapped. Much of the near field and some portions of the horizon are obscured by hardware from the view of one or both cameras. Reference to the "Skyline Drawings" contained in Appendix B will reveal the nature and extent of the obscuration. Contour lines, which physically must all be closed, can only rarely be completed on the maps, as generally only relatively short segments can be followed stereoscopically (or for that matter monoscopically) without interruption.

2) Only the facing masks of rocks and the more remote undulations can be mapped. Thus, e.g., rocks are developed either as single or multiple partial contours, indicating the portions of the rocks that could be jointly imaged by both cameras. The entire process of map printing was performed by computer. As the subroutine that layed down the elevation values on the maps was a simple one, there are occasions, especially for steeply inclined surfaces, where the elevation values will pile on top of oneanother, or otherwise be overwritten and become unreadable. In these instances, the elevation values may be determined by reference to the camera perspective represention of the maps, as discussed in sect. 3.2.1.

3) The ranging accuracy falls off roughly quadratically with range, deteriorating rapidly as one approaches 100 meters range. This leads to noisy data at larger ranges (as discussed in further detail below, and in Appendices D and E).

4) The elevation contour intervals are variable with range, reflecting the the deterioration of spatial resolution and ranging accuracy with range.

5) A nonlinear coupling was used between the hand-input trackball device and the 3-space mark employed to generate the map data, in order a) to enable the approach to large distances with a reasonable number of rolls of the trackball, and b) to facilitate acquisition of 3-D data at a spatial density reasonably related to that of the 3-D information extractable from the images. The individual points constituting the development of the digital contour lines were generally recorded at a quantum granularity somewhat below the theoretical limit of point-ranging resolution inherent in the imagery, or equivalently that of the raster dis-

play system, which mapped 1:1 to the imaged points. At the larger ranges, where the range uncertainty is relatively great, the quantization of the radial distance becomes conspicuous in the maps. At larger ranges, the maps are characterized by features developing a rather exaggerated "u-shape-like" form in a direction extended toward the lander. This artifact in the data is explained in Appendix E. It results from a combination of the two phenomena, one having to do with the nature of the parametrization of trackball motion relative to Martian 3-space displacement of the ranging mark, and the other with the lack of visual feedback from cursor motion when stretching the limits of ranging resolution. The magnitude of the distortion of remote features is generally comparable with the theoretical ranging error at the distance involved. The primary purpose in working so far from the lander, rather than limiting the mapping to smaller values of range, was to milk the data for whatever it was worth, i.e., to establish elevations and rough range positions for features that could not individually be detailed.

6) It is to be noted that the maps are entirely unedited, being reproduced precisely as they were recorded in the original generation process. We have been encouraged to "smooth" the lines to suppress the quantum jaggies. In response, to this, a simple-minded smoothing has been applied, in that the line elements of the plots represent a connection of the midpoints between recorded data points. This smoothing algorithm had minimal visible effect on the maps due to the fact that at the larger range values, where the the effect of smoothing would be most evident, the absolute lateral quantization is much finer than that for the radial quantization. Thus, there would generally be a number of lateral jumps for each radial jump. The result was for there to be almost no visible influence on the data. It is suggested that while a more sophisticated smoothing might be soothing, with familiarity the jaggies will not only not be annoying, but will in fact alert the user to the magnitude of the range uncertainty inherent in the data, thereby discouraging unjustified inferences regarding shape and accuracy.

3.4 Vertical Profile Maps

The vertical profile maps are all plotted within the same 50-cm-frame size (true-scale) that was adopted as the standard for the elevation contour maps. As with the contour maps, the vertical profile maps are also reproduced at half-size. The coordinate system of the vertical profile plots is the same as that for the elevation contour sheets, namely, the Local Gravity-Normal (LGN) system.

Systematic vertical profiles have been generated for both landers at 5°-azimuth intervals around the vertically oriented LGN z-axis. The angular orientation of the profiles is measured clockwise from a reference of 0° in the direction of the LGN negative y-axis (the direction generally backward relative to the lander). Each of the profiles is run from the closest possible point to the lander to the remote limits of ranging capability. The policy followed for the elevation contours, namely, that the choice of scales should be such that each plotted line should be viewable at resolution on some sheet, was compromised for the profile sheets. The profiles are plotted at three different scales: 1:10, 1:100 and 1:1000. For each scale, the landing site is divided into four quadrants and also into a scale-dependent number of annular zones, the latter corresponding to spans of horizontal range. For any given scale, all of the vertical profiles associated with a given quadrant and span of horizontal range are plotted on the same sheet. This entails plotting the profiles for nineteen different values of azimuth on the same sheet.

The number of annular zones and the span of horizontal range for the annular zones associated with each of the three scales is as follows: For scale 1:10, there are four annular zones in front and three in back, with horizontal range spans of 0-5 m (front only), 5-10 m, 10-15 m, and 15-20 m. For scale 1:100, there are two zones, with spans of 0-50 m, and 50-100 m. For scale 1:1000, there is a single range of 0-500 m. The surface of Mars in range 0-5 m in back of the lander is obscured by lander hardware. Thus there are 26 vertical profile sheets generated for each lander, consisting of seven for each of the forward quadrants and six for each of the back.

Figure 2 shows an example of a half-size version of a vertical profile plot for Viking lander 1. The sheet has been generated for scale 1:20, a span of horizontal range from 0 to 50 m, and span of azimuth from 90° to 180°, inclusive (the left forward quadrant).

The abscissa indicates the horizontal range, in meters. The relative elevation scale of the vertical profiles is indicated in the upper left-hand portion of the sheet; it is 1:1 with the scale for the horizontal range. In order to geometrically separate the various profiles from oneanother the zeros of reference for the elevation values are displaced from oneanother along the ordinate. Each is offset vertically from its neighbor by by 2 cm (true-scale.) The reference lines are each labeled with the corresponding azimuth values for the profiles. In order to facilitate associating individual profile plots with their corresponding zero elevation reference lines, and additionally to facilitate unambiguous profile tracking at crossovers, three different values of line thickness have been used, in cyclic fashion, in plotting the profiles. The line weight associated with any particular profile is indicated by the thickened portion of the corresponding elevation reference line, in the neighborhood of the first vertical bar inside the plot frame from the left hand side.

No tabulation of the kind preceding the elevation contour maps has been prepared. In the instance of the vertical profiles, the sheets are more conveniently ordered for indexing. Namely, they are first grouped by quadrant in clockwise order starting from the back left quadrant, then within each quadrant by order of decreasing scale number, and within each scale by order of increasing range.

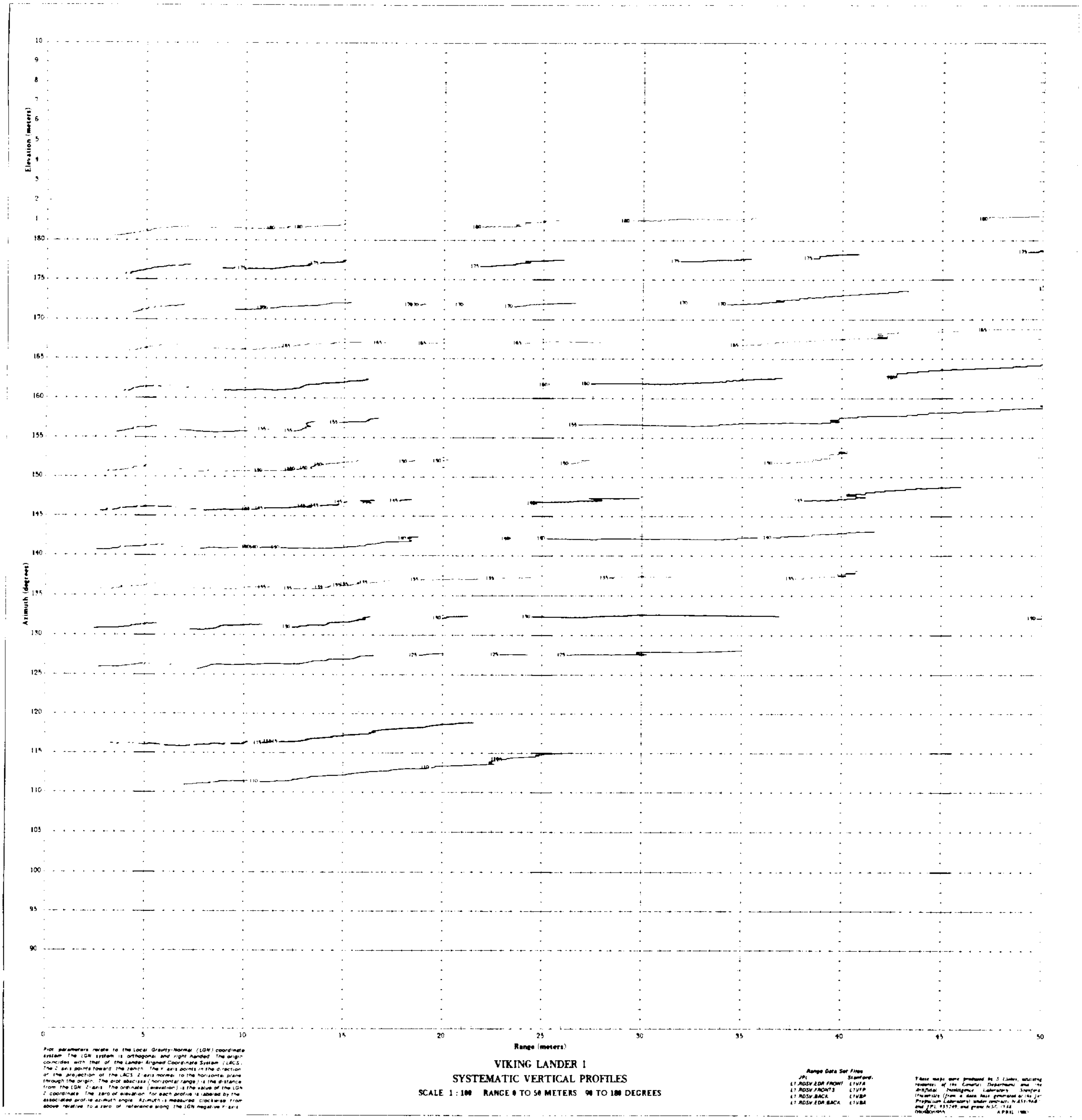

Fig. 2. Example of a vertical profile plot sheet.

4. ELEVATION CONTOURS

4.1 Elevation Contour Mosaic Overlay Stereo Pairs

This section contains mosaic stereo pairs of images into which have been overlayed the systematic elevation contour lines. The lines are extremely fine, and as such do not reproduce well in the half-tone figures of this report. The reader interested in seriously working with the map data should consider obtaining photographic print versions of the half-tone overlay images contained in this report (see Appendix F). Once generated, the RDSs — representing the geometric descriptions of the contour and vertical profile data sets — are no longer directly coupled to the particular mosaics used for their generation, e.g. morning, noon, or evening. For logistical reasons related to the scope of the project, all of the contour and vertical profile RDSs have been overlayed uniformly only into morning mosaics. However, both morning and evening mosaics were used in generating the RDSs. Since the individual image segment windows that went into the various mosaics were not the same, and furthermore since the sampler arm rested in various positions when the contributing image segments were acquired, there will be instances where small regions of an overlay will exhibit contour/profile lines in the absense of underlying imagery, and vice versa. Additionally, the times of day of the overlay mosaic will not always be the most favorable for viewing either the topography in stereo, or for showing the overlay lines in good contrast. The images, as reproduced, represent two-fold enlargements from portions of 8"x10" duplicate negatives. The image identification numbers are included in the figure captions for reference purposes.

A stereo viewer will be required in order for the reader to view the images of this report stereoscopically. Even with a viewer, not all parts of the images can be stereoscopically fused. Difficulties arise in the near field to either side of center, due to the relative vertical parallax, local relative rotation, and projected size differences. Kenneth L. Jones has created sets of stereo images, call VLSTEREO, that suppress the vertical parallax differentials in first approximation [Levinthal, 1980]. However, not all of the elevation contours and vertical profile overlays have been created in the VLSTEREO form. Thus, rather than present some images in standard form and others in VLSTEREO, the present report contains only the standard form. Readers interested in obtaining photographic quality versions of images contained or referenced in this report, or any of the various other lander image data forms are referred to the report of Levinthal and Jones [Levinthal, 1980] for product descriptions and ordering information.

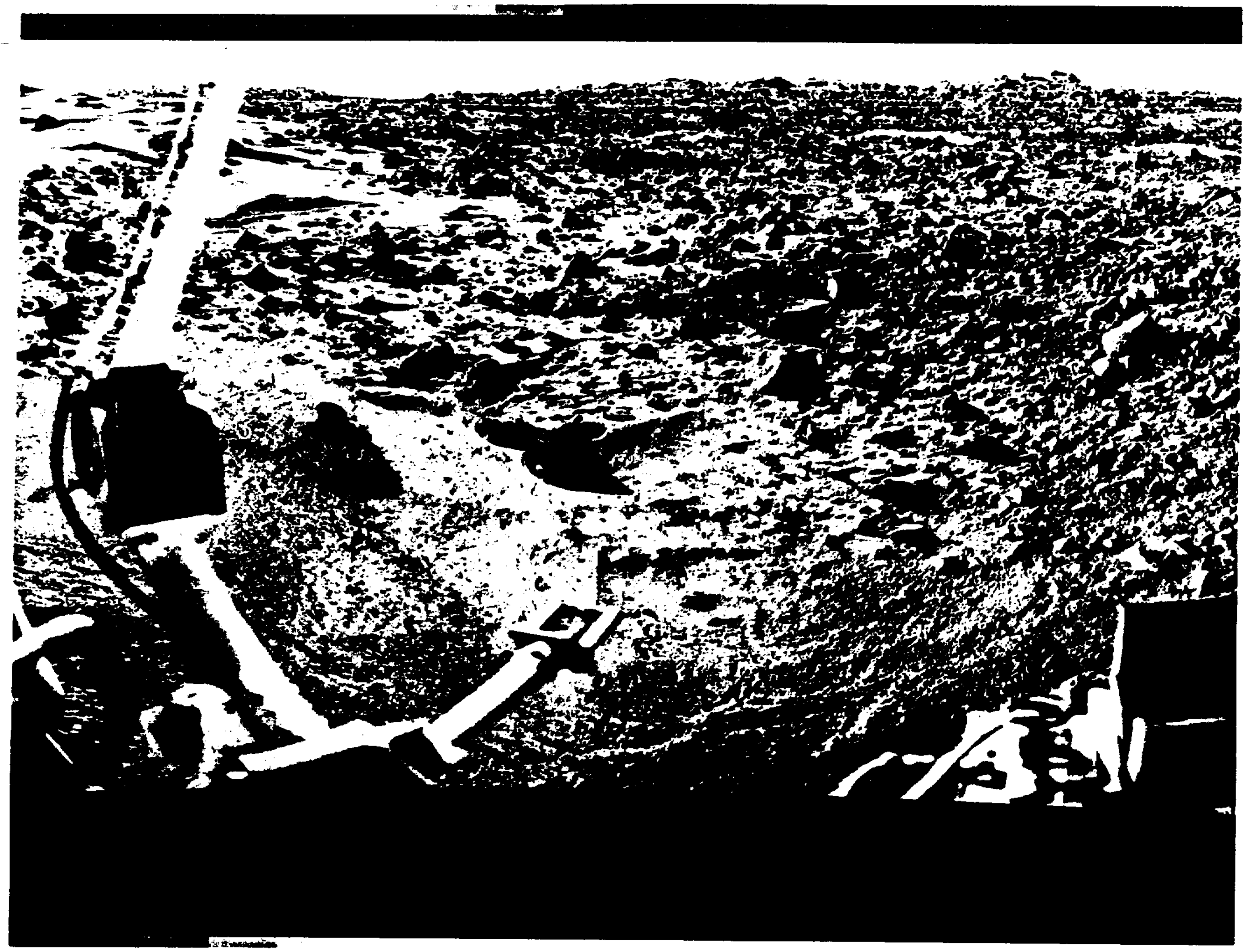

Fig. 3. Elevation Contour Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/07/15/100746.

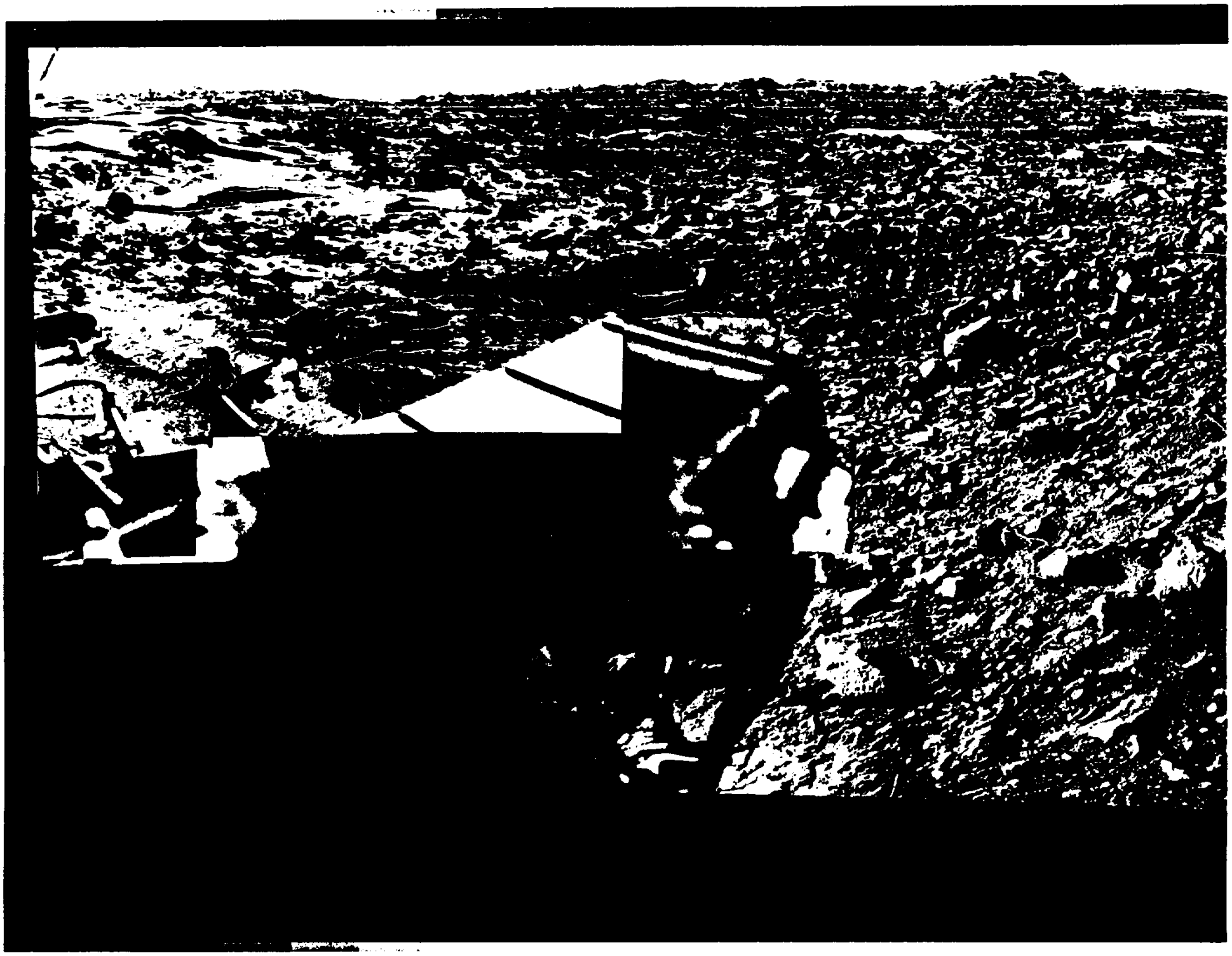

Fig. 4. Elevation Contour Overlay Mosaic: Camera 2 (right), front left quadrant — from IPL PIC ID 79/03/22/035818.

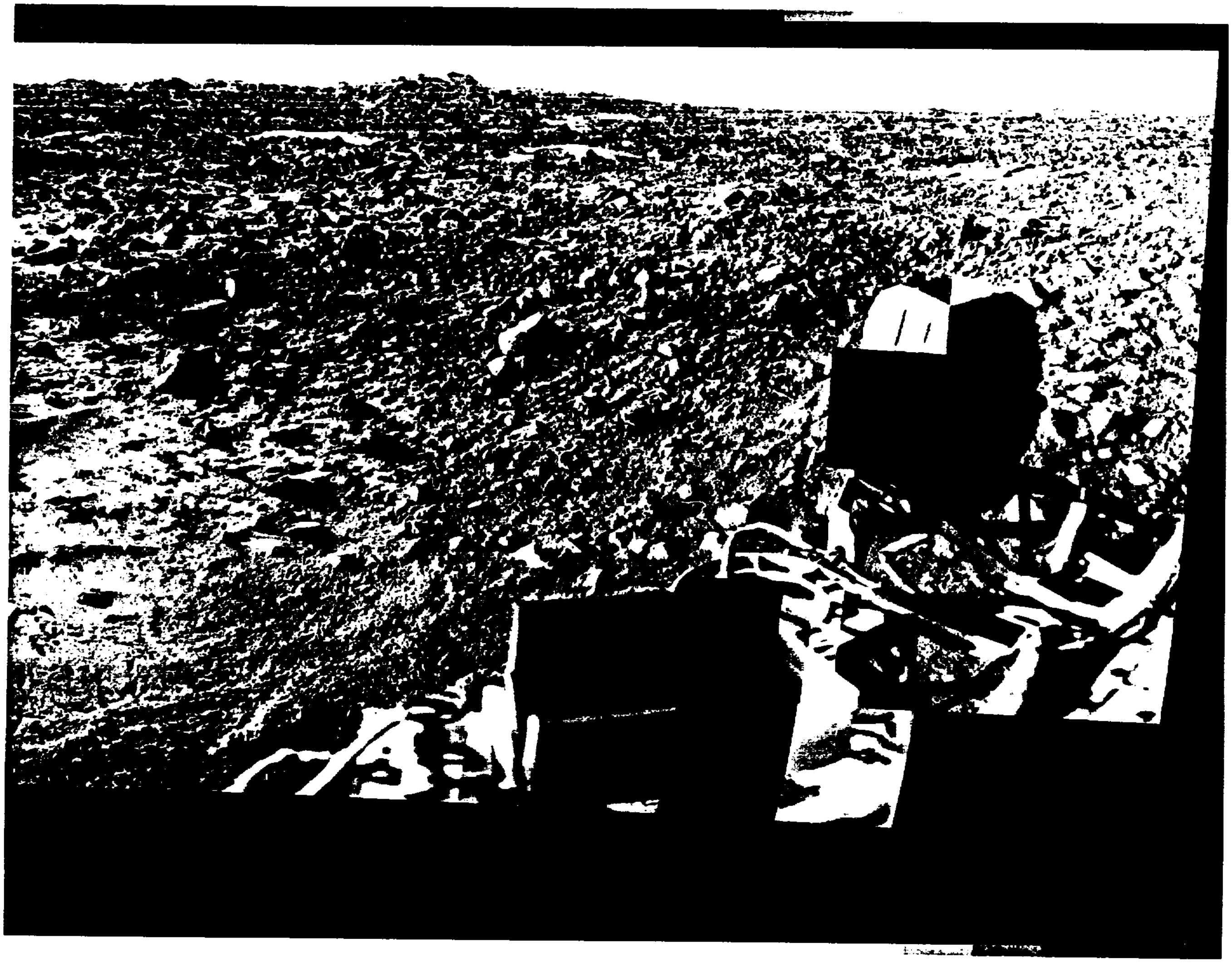

Fig. 5. Elevation Contour Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/07/15/100746.

Fig. 6. Elevation Contour Overlay Mosaic: Camera 2 (right), front right quadrant — from IPL PIC ID 79/03/22/035818.

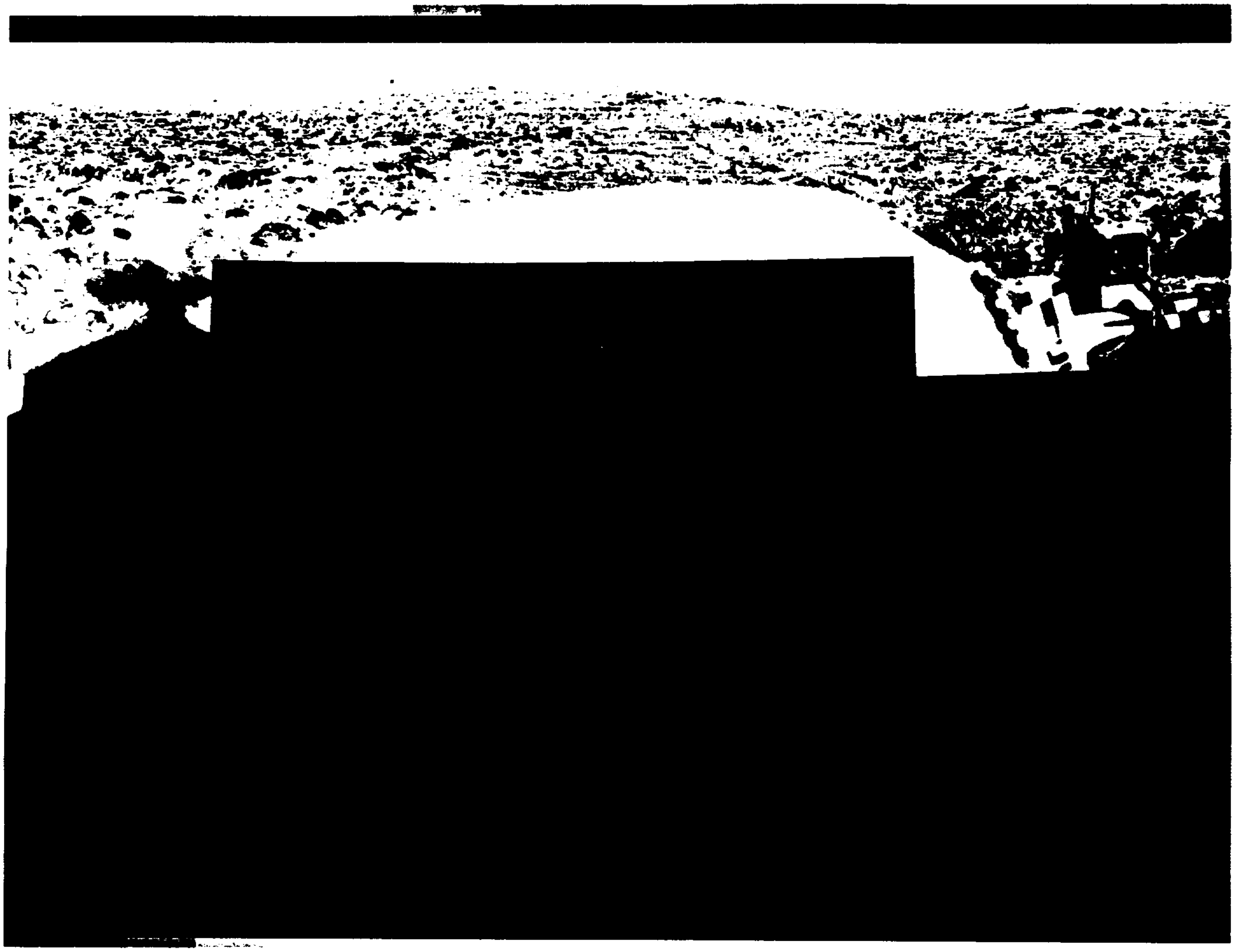

Fig. 7. Elevation Contour Overlay Mosaic: Camera 2 (left), back left quadrant — from IPL PIC ID 79/07/15/112532.

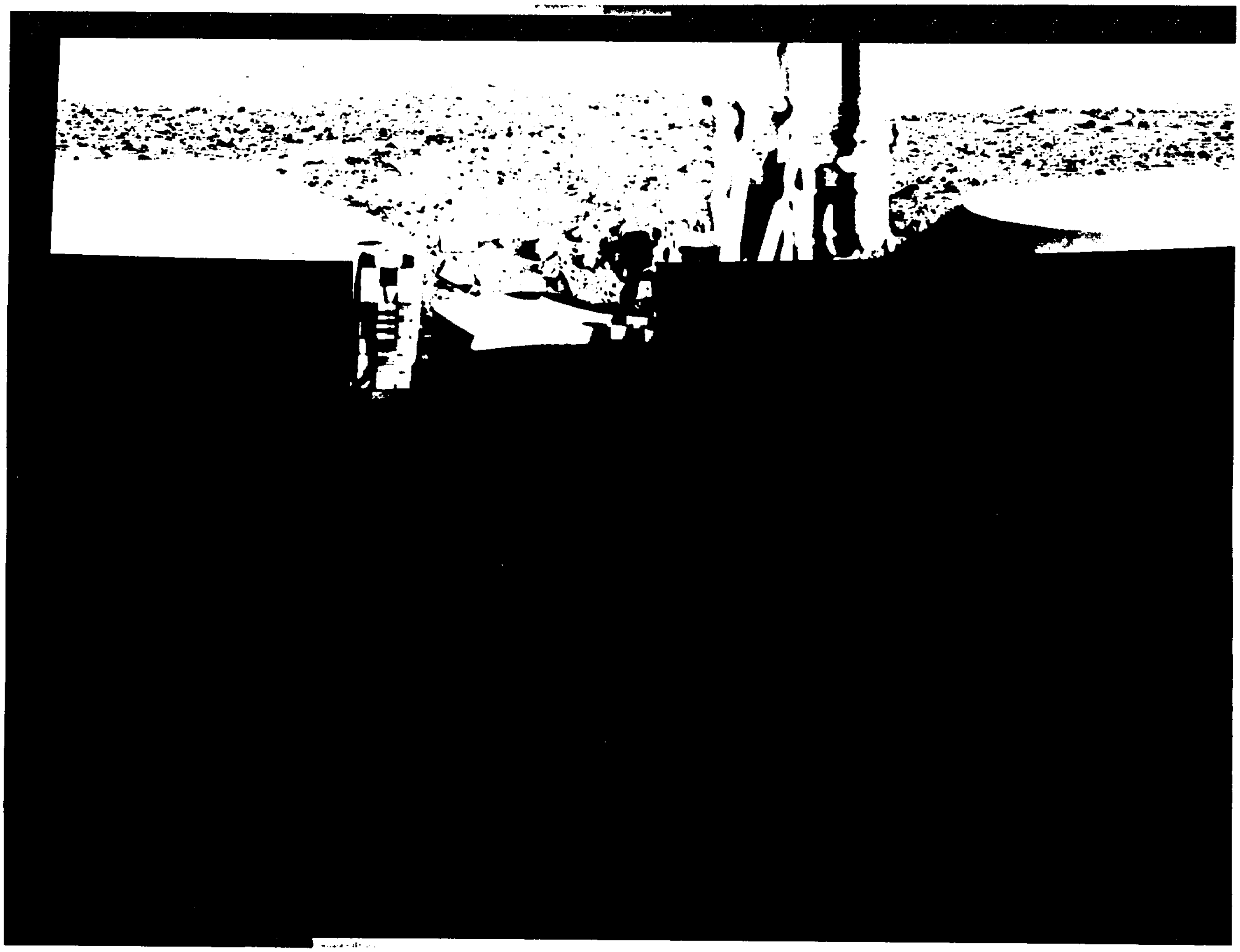

Fig. 8. Elevation Contour Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/03/20/034017.

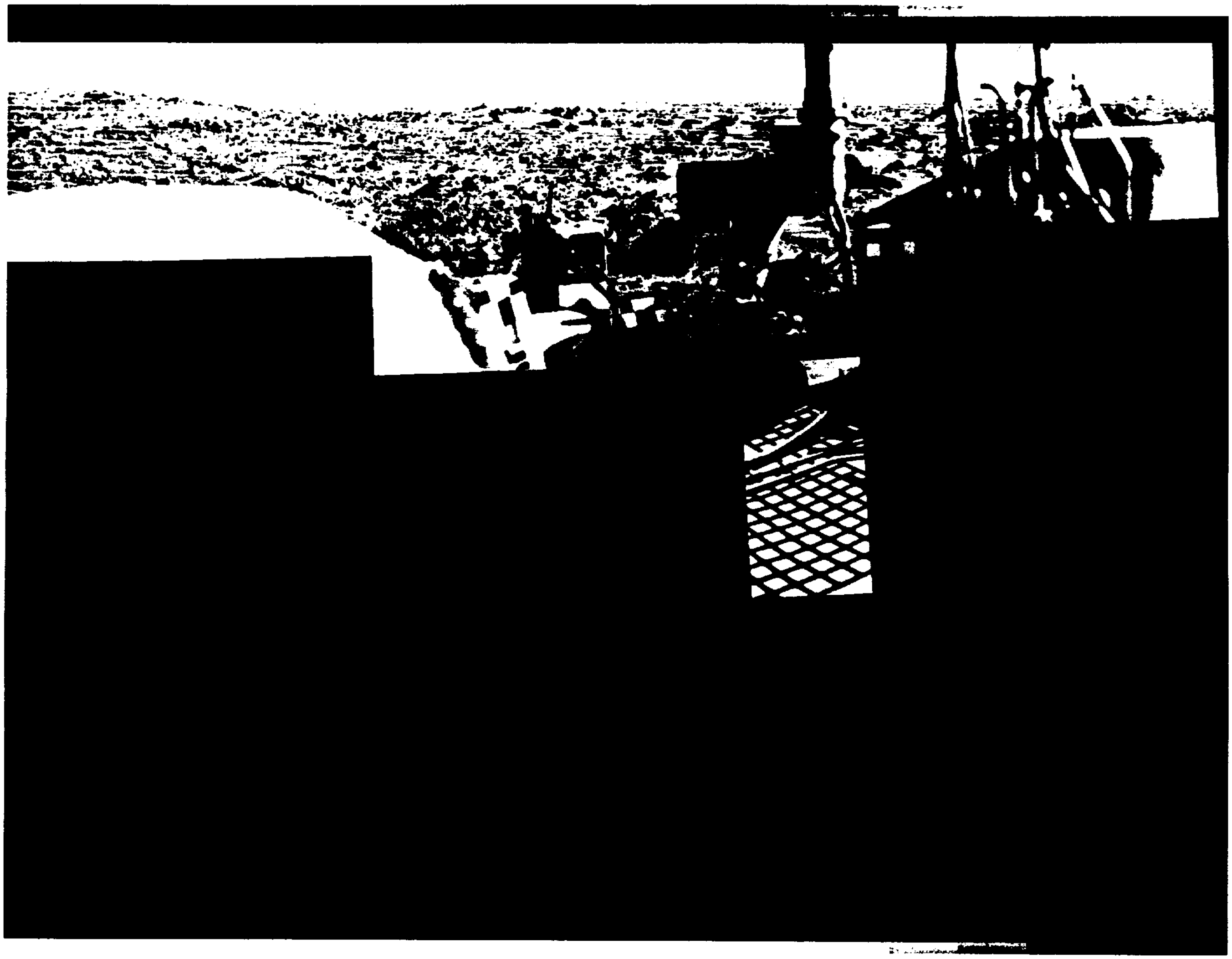

Fig. 9. Elevation Contour Overlay Mosaic: Camera 2 (left), back right quadrant — from IPL PIC ID 79/07/15/112532.

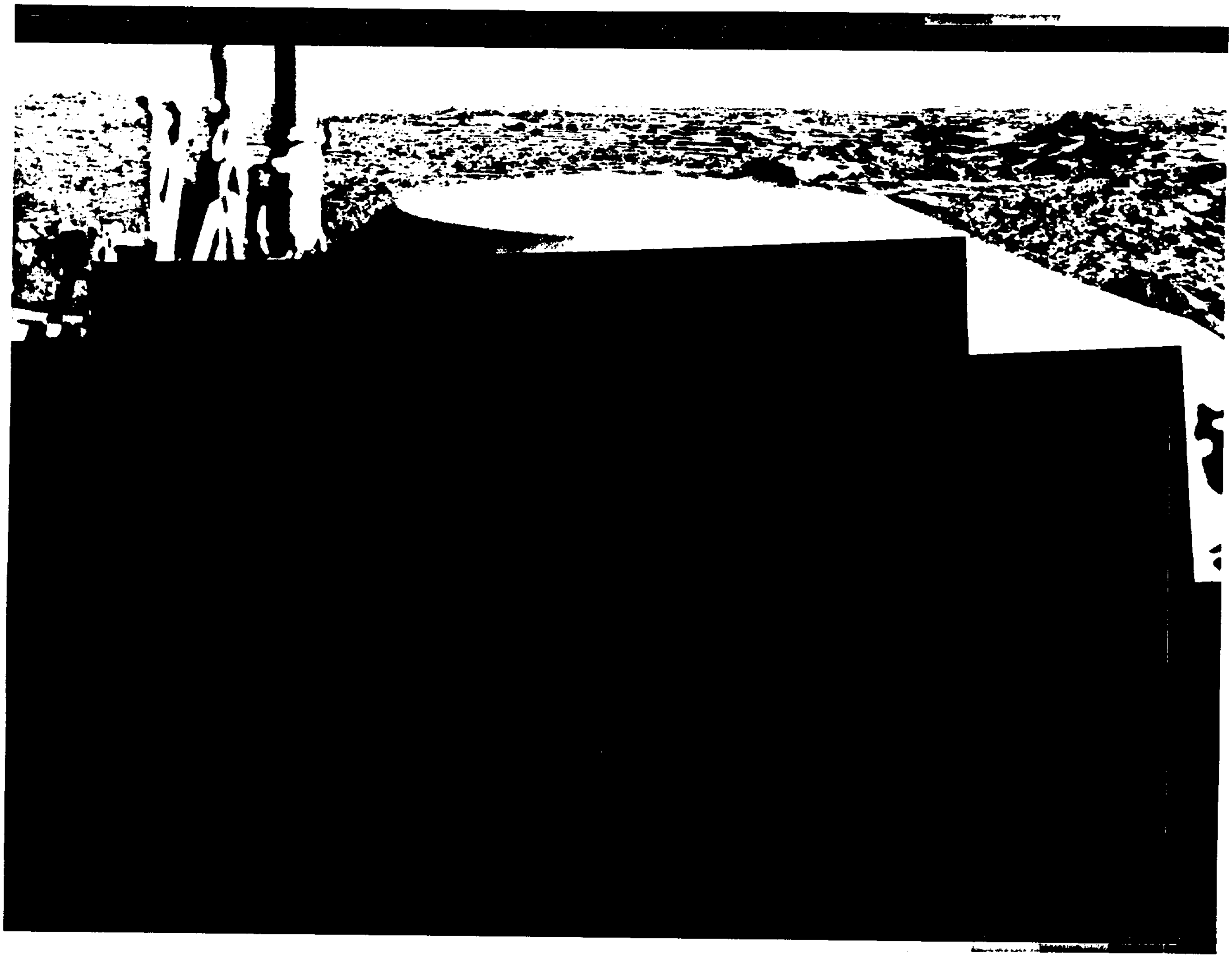

Fig. 10. Elevation Contour Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/03/20/034017.

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4.2 Camera Perspective Annotated Elevation Contours — Camera 1

This section contains camera-1 perspective representations of the elevation contour map data. The nature and purpose of these representations has been explained in section 3.2.1. On opposing pages are presented mosaic overlays of the elevation contour lines, and corresponding camera perspective representations of the map data, with the individual lines of the map data annotated with elevation values. The general discussion of section 4.1 applies to the mosaics of this section.

Fig. 11. Elevation Contour Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/07/15/100746.

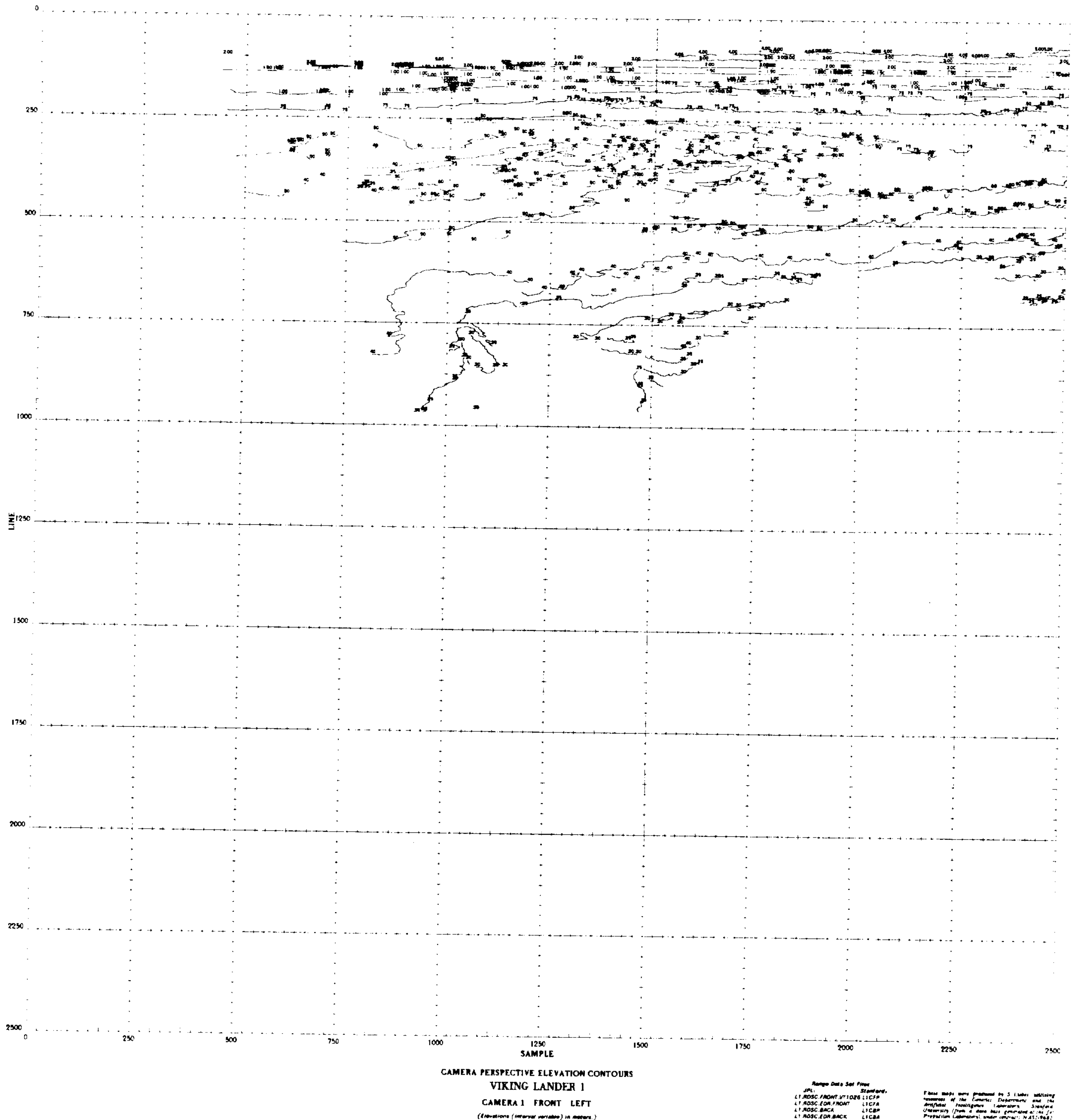


Fig. 12. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), front left quadrant.

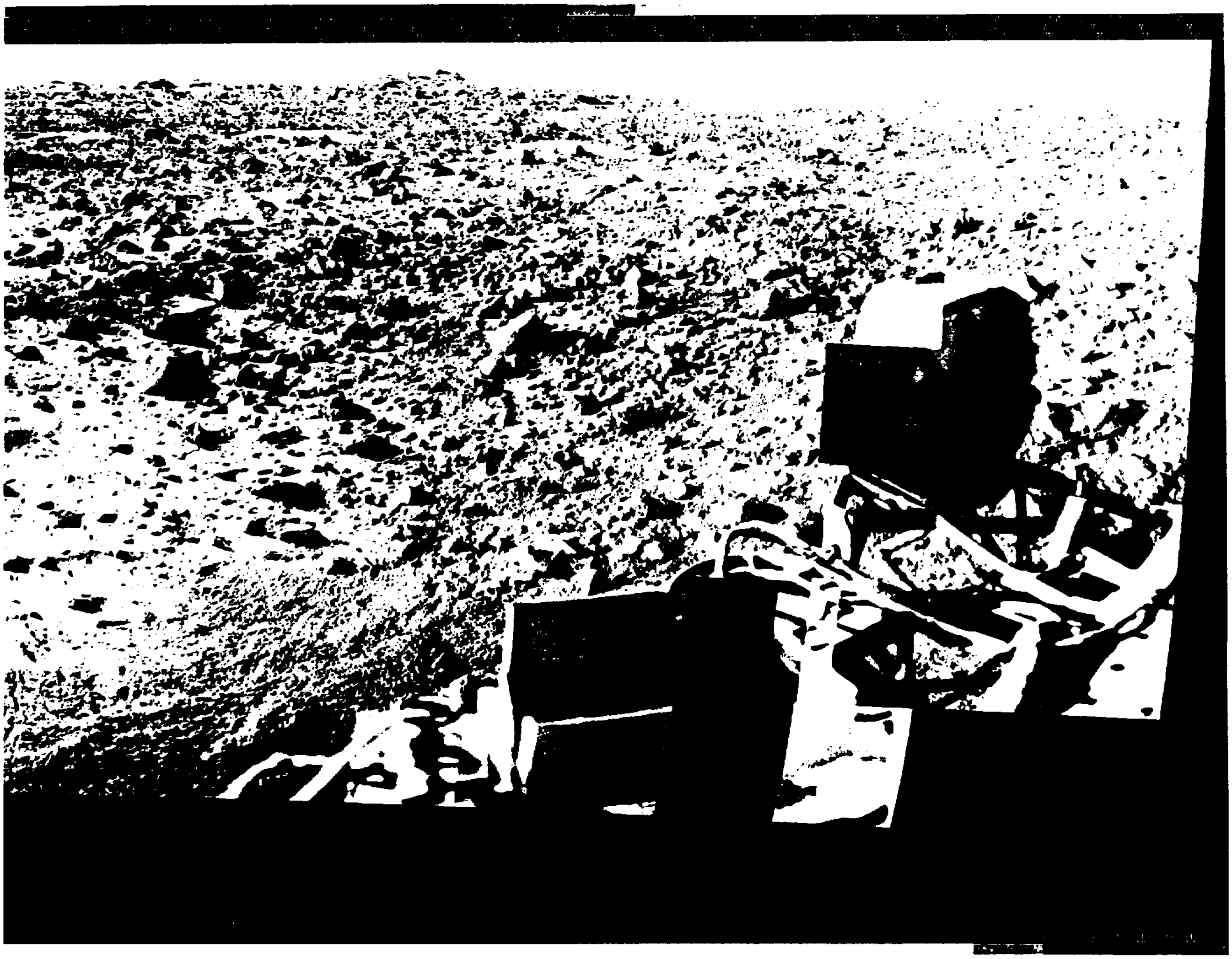


Fig. 13. Elevation Contour Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/07/15/100746.

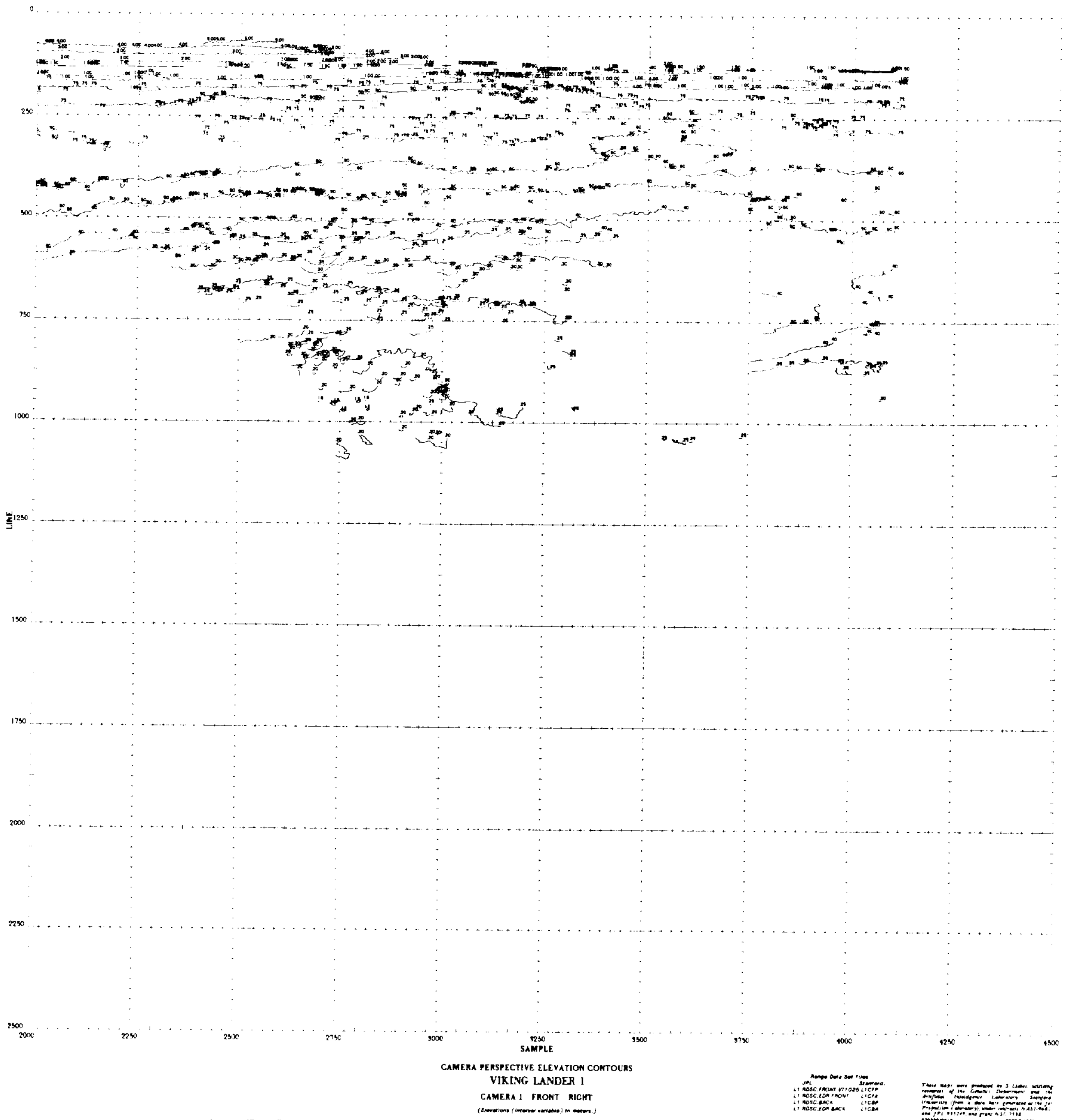


Fig. 14. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), front right quadrant.

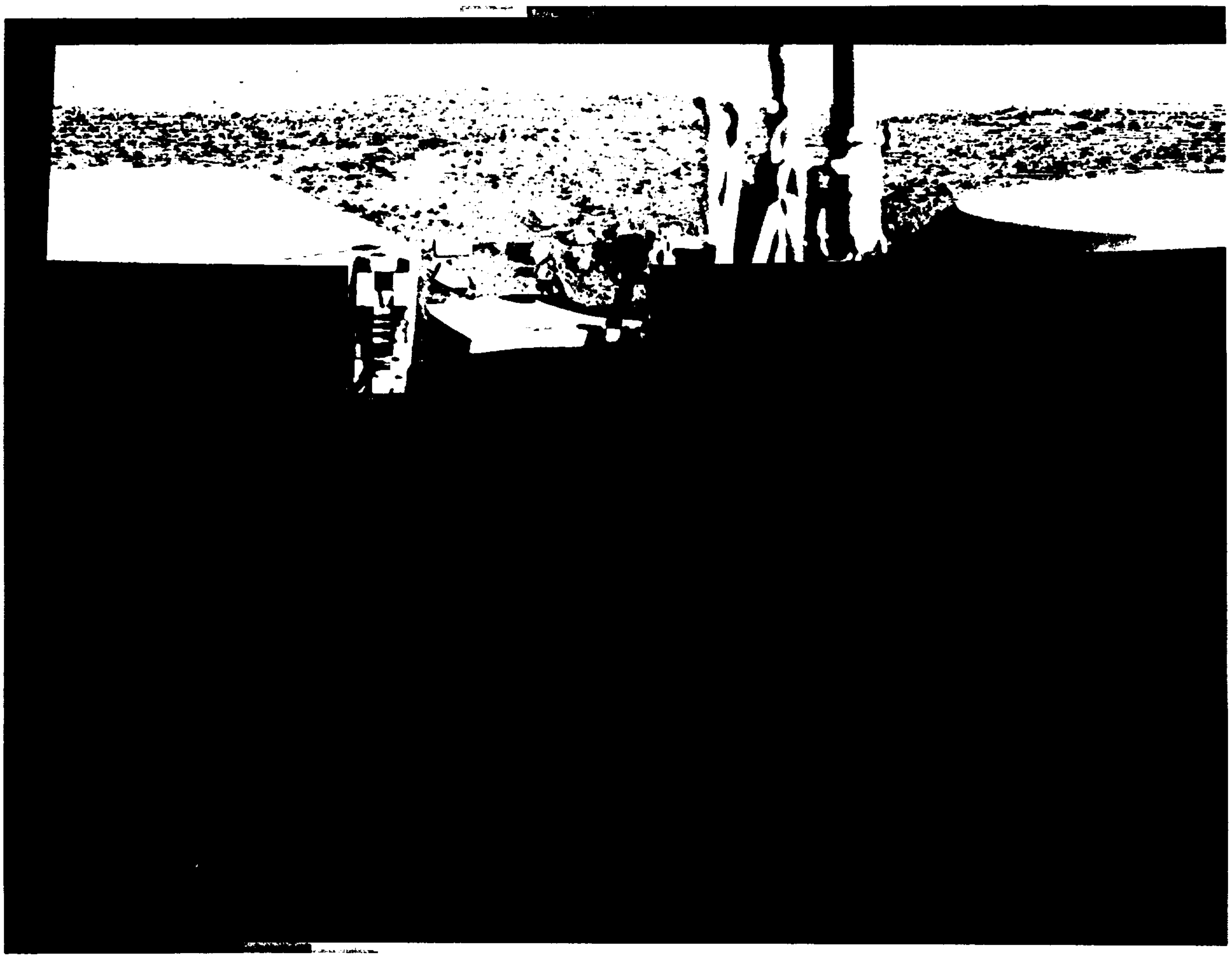


Fig. 15. Elevation Contour Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/03/20/034017.

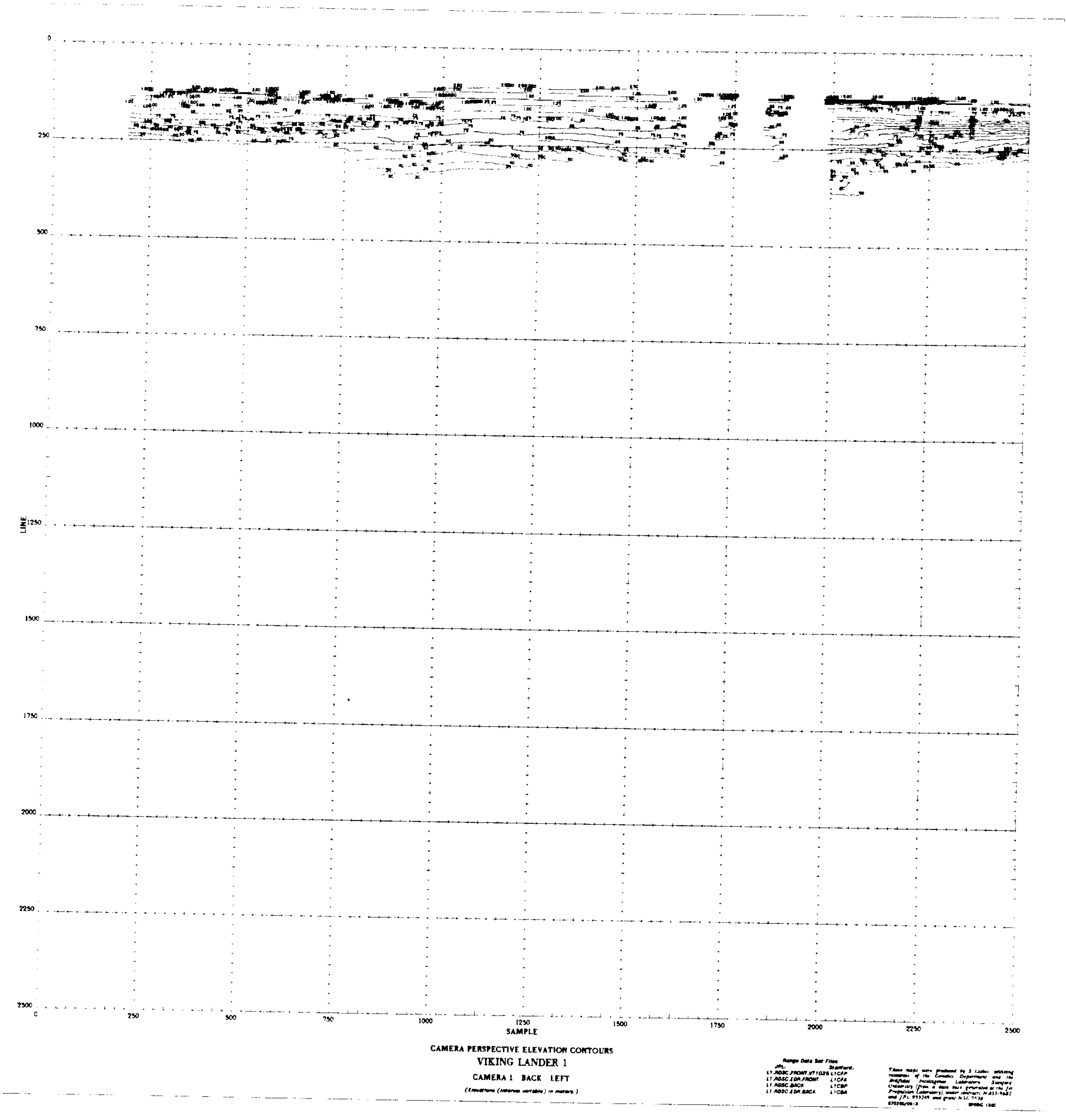


Fig. 16. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), back left quadrant.

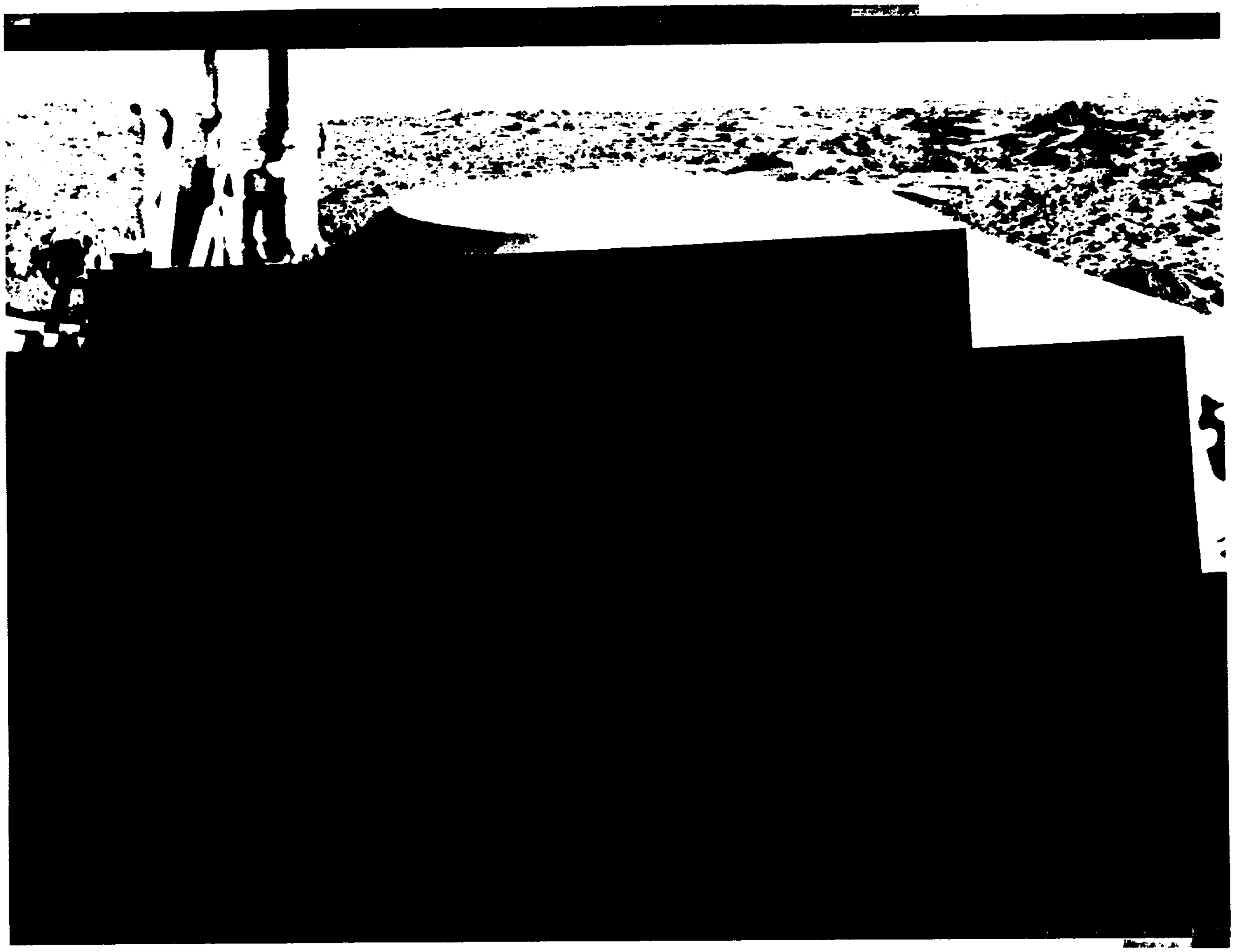


Fig. 17. Elevation Contour Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/03/20/034017.

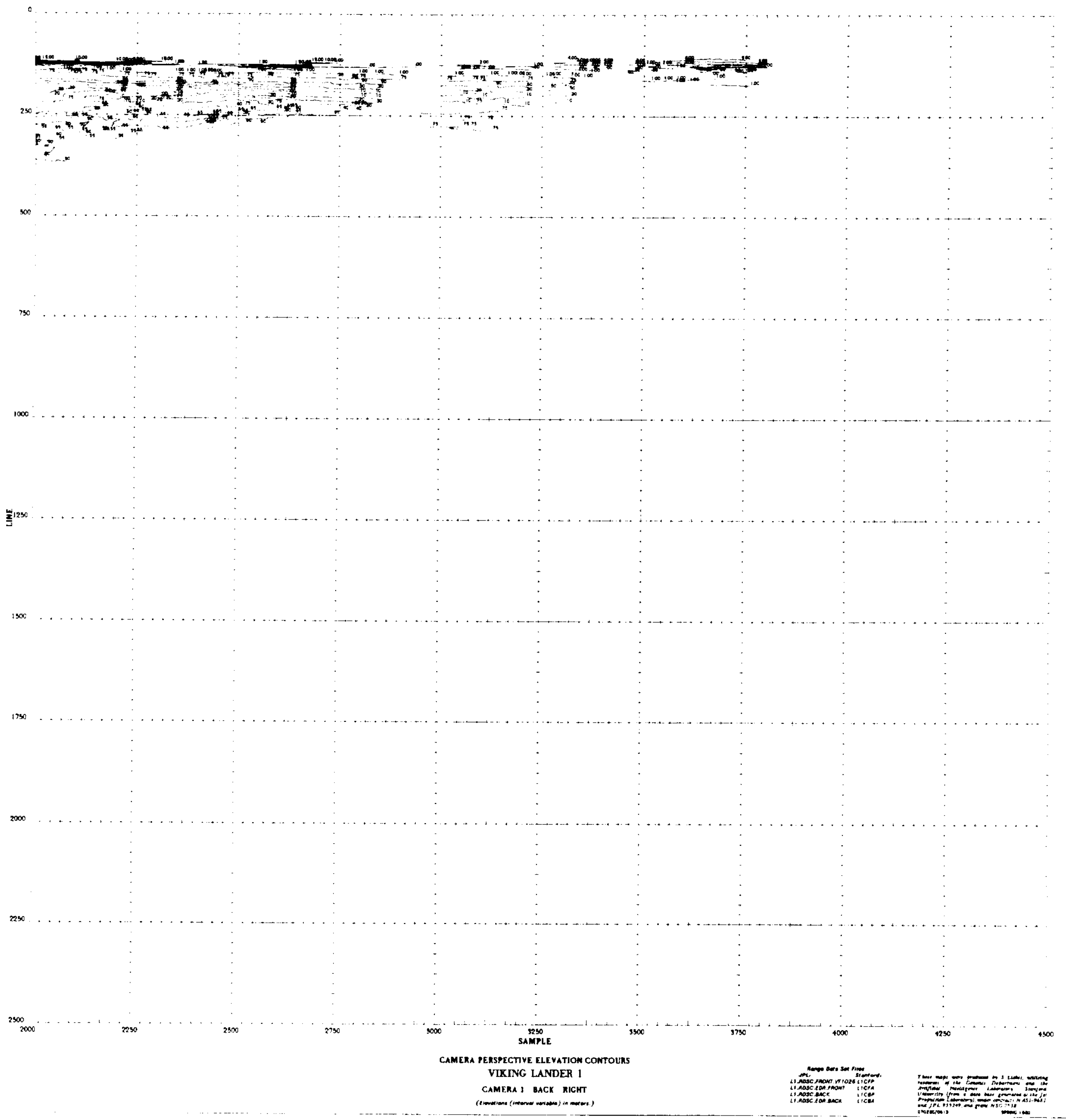


Fig. 18. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), back right quadrant.

4.3 Elevation Contour Map Collection

4.3.1 Tabulation of Elevation Contour Map Sheets

The purpose of the following tabulation is to facilitate paging to desired map sheets, as well as to indicate which sheets have been produced. A separate tabular array is presented for each scale. The rows and columns of the arrays are labled with the parameters of the sheet array designators (see section 3.3) of the individual map sheets. The column labeling indicates the value of the first parameter of the designator, and the row labeling indicates the second parameter of the designator. The array entries associated with the designators indicate the page number upon which the sheet may be found.

VL1 Contour Sheets				Scale 1:2000			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				31			
−2							
−4							
−4							
−6							

VL1 Contour Sheets					Scale 1:100			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				38	39			
−1				40	41			
−3								
−5								
−7								

VL1 Contour Sheets					Scale 1:5			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			75	76	77	78		
+1			79	80	81	82		
−1								
−3								
−5								
−7								

VL1 Contour Sheets				Scale 1:1000			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				32			
−2							
−4							
−4							
−6							

VL1 Contour Sheets					Scale 1:50			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				42	43			
−1				44	45			
−3								
−5								
−7								

VL1 Contour Sheets					Scale 1:2			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5		83	84		85	86		
+3		87	88			89	90	
+1								
−1								
−3								
−5								
−7								

VL1 Contour Sheets				Scale 1:500			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				33			
−2							
−4							
−4							
−6							

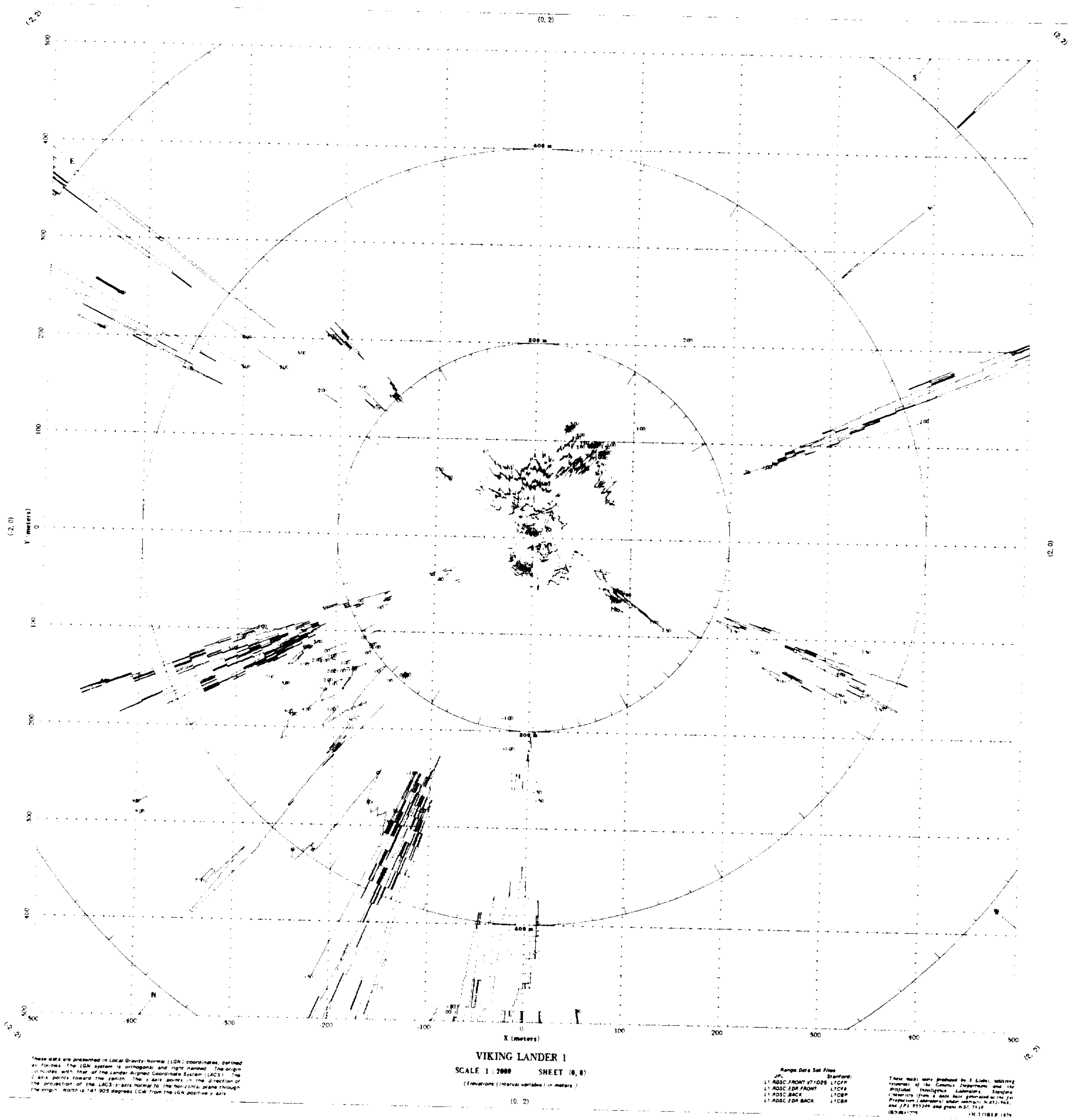
VL1 Contour Sheets					Scale 1:20			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			46	47	48	49		
+1			50	51	52	53		
−1			54	55	56	57		
−3			58	59	60	61		
−5								
−7								

VL1 Contour Sheets					Scale 1:1			
	−7	−5	−3	−1	+1	+3	+5	+7
+7	91						92	93
+5								94
+3								
+1								
−1								
−3								
−5								
−7								

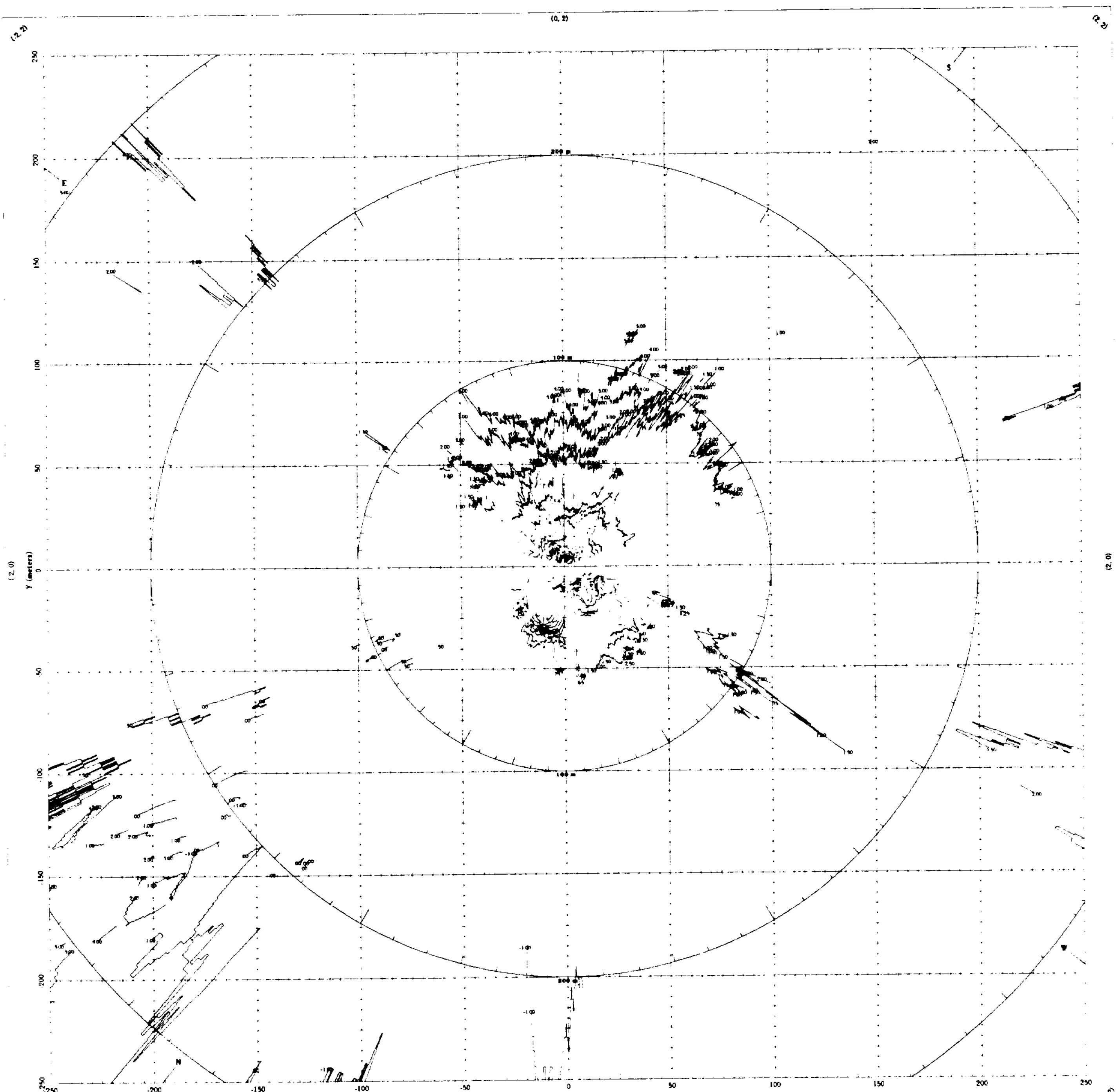
VL1 Contour Sheets					Scale 1:200			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				34	35			
−1				36	37			
−3								
−5								
−7								

VL1 Contour Sheets					Scale 1:10			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			62	63	64	65		
+1			66	67	68	69		
−1						70		
−3			71	72	73	74		
−5								
−7								

Table 1. Tabulation of Elevation Contour Map Sheets.



(0, 2)
(2, 0)
(-2, 0)
Y (meters)
X (meters)
N
E
S
W
400 m
200 m
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y axis.
VIKING LANDER 1
SCALE 1 : 2000
SHEET (0, 0)
(Elevations (interval variable) in meters)
Range Data Set Files
JPL
Stanford
L1.RDSC.FRONT.VT1026
L1CFP
L1.RDSC.EDR.FRONT
L1CFA
L1.RDSC.BACK
L1CBP
L1.RDSC.EDR.BACK
L1CBA



VIKING LANDER 1

SCALE 1 : 1000 SHEET (0, 0)

(Elevations (interval variable) in meters.)

(0, -2)

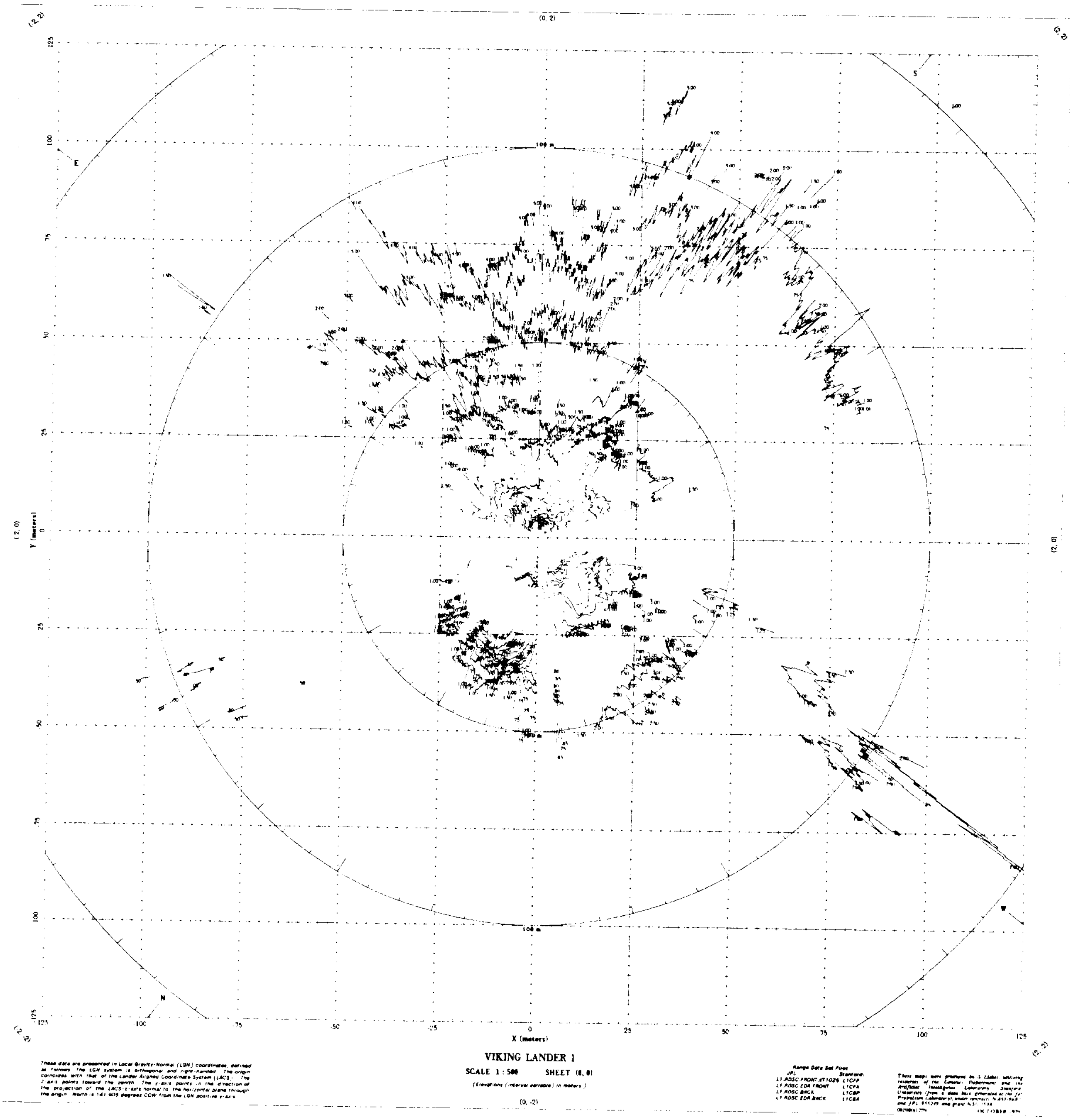
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.808 degrees CCW from the LGN positive y-axis.

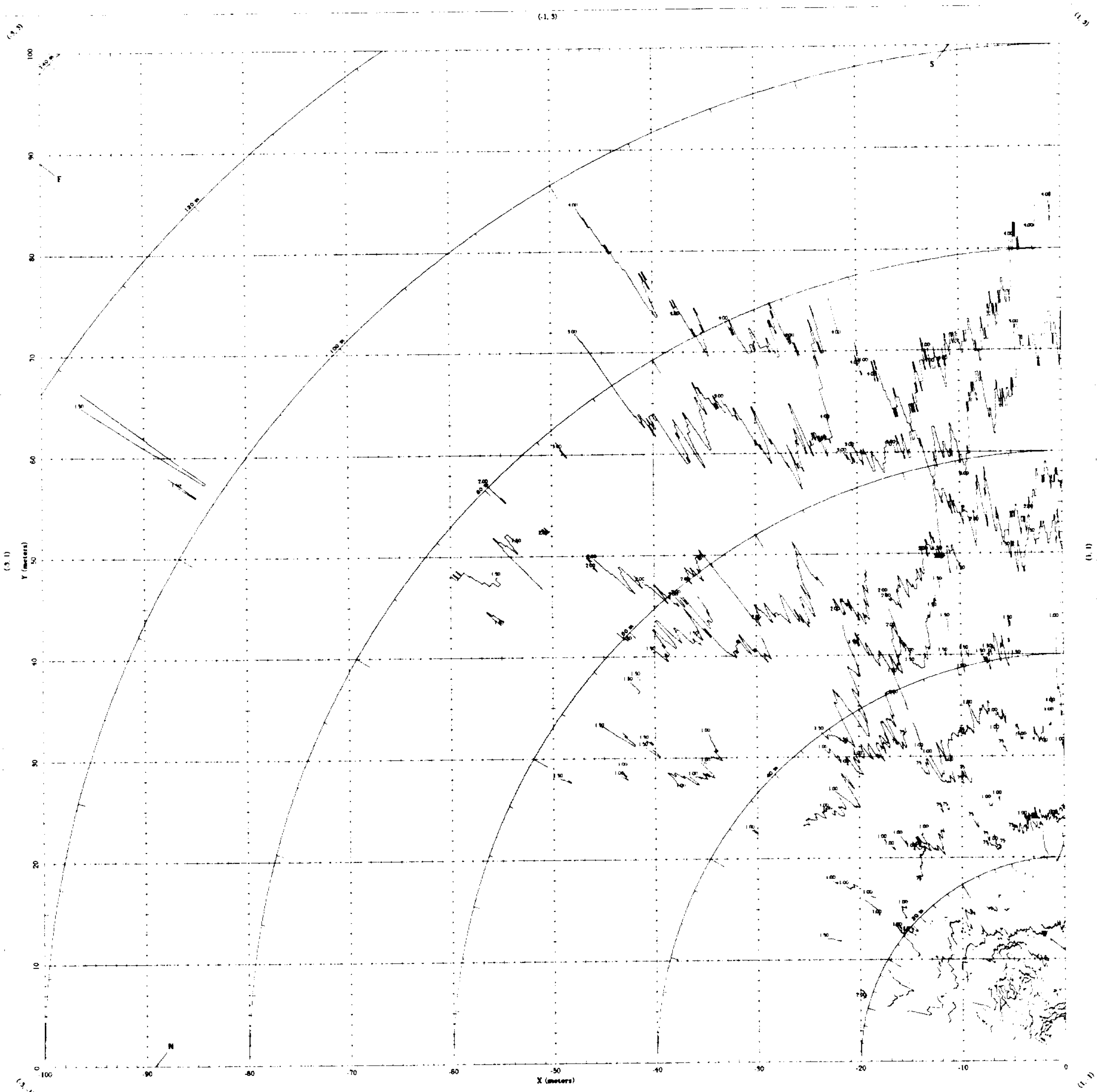
Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL [illegible], and grant [illegible]

[illegible] OCTOBER 1979


VIKING LANDER 1
SCALE 1 : 500 SHEET (0, 0)
(Elevations (interval variable) in meters.)
X (meters)
Y (meters)
100 m
N
E
S
W
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.
Range Data Set Files
JPL Stanford
L1.RDSC.FRONT.VT1026 L1CFP
L1.RDSC.EDR.FRONT L1CFA
L1.RDSC.BACK L1CBP
L1.RDSC.EDR.BACK L1CBA



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 200 SHEET (-1, 1)

(Elevations (interval variable) in meters)

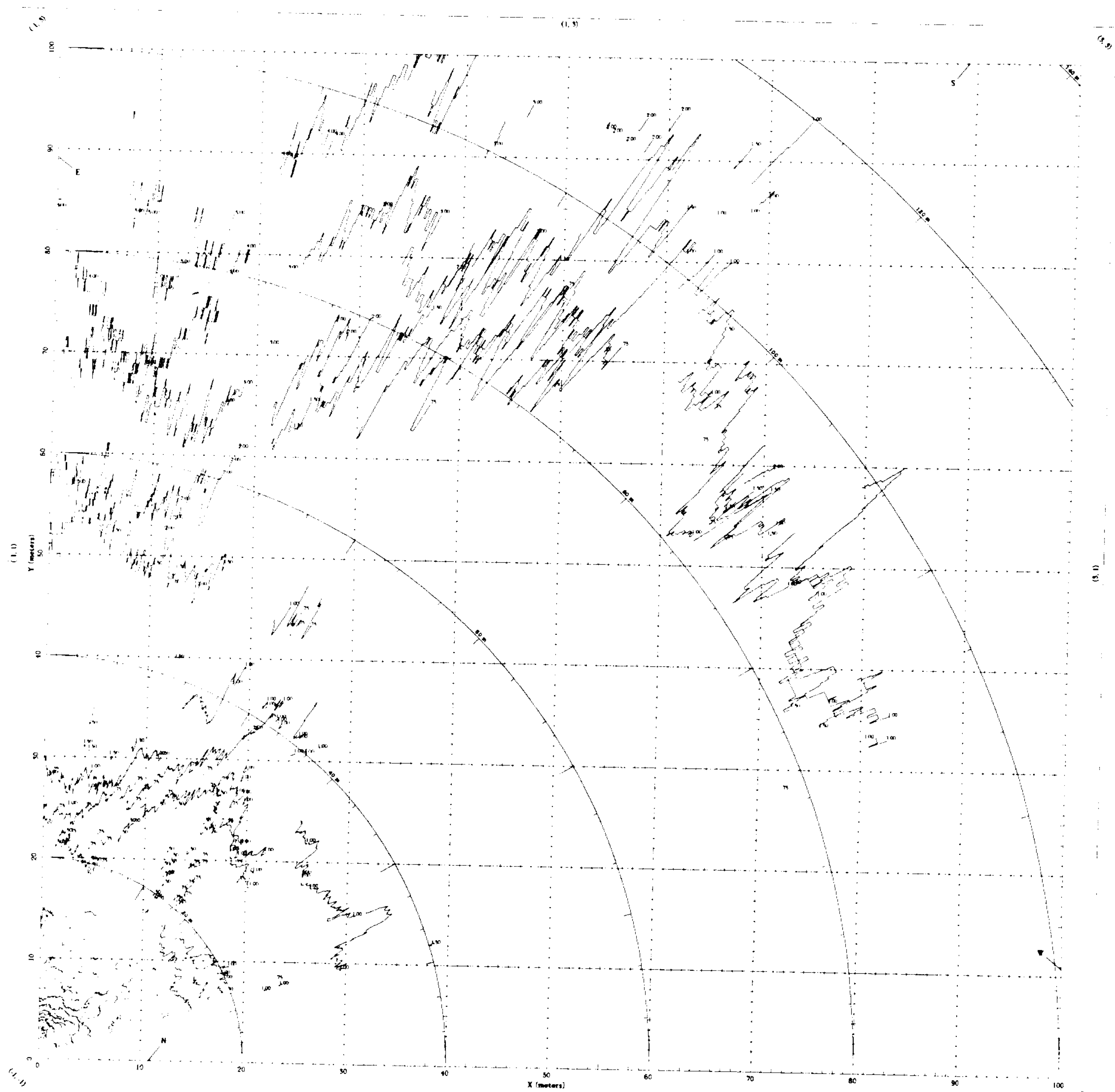
(-1, -1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes utilizing facilities of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7538.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The x axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 200 SHEET (1, 1)

(Elevations (interval variable) in meters.)

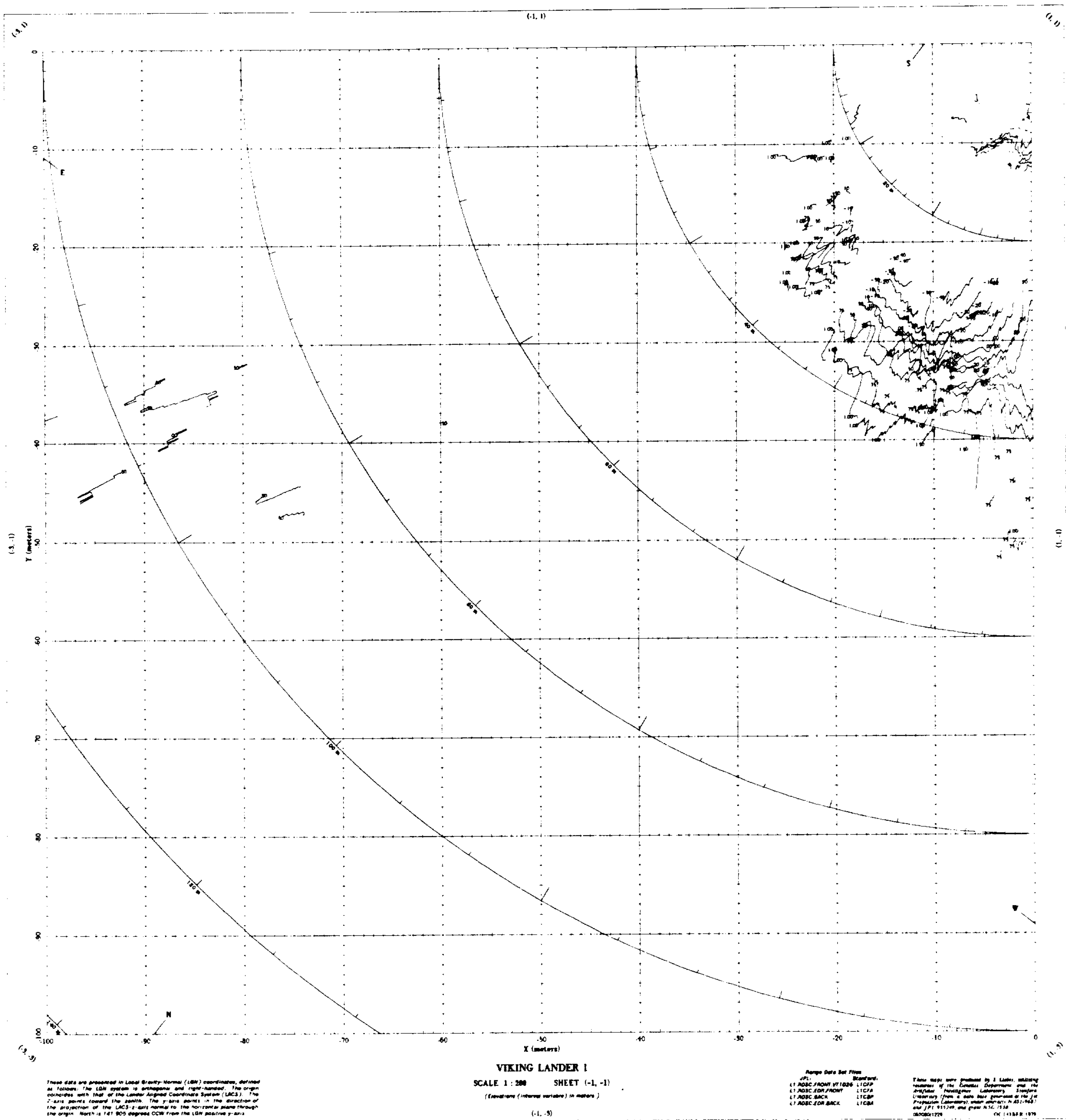
(1, -1)

Range Data Set Files

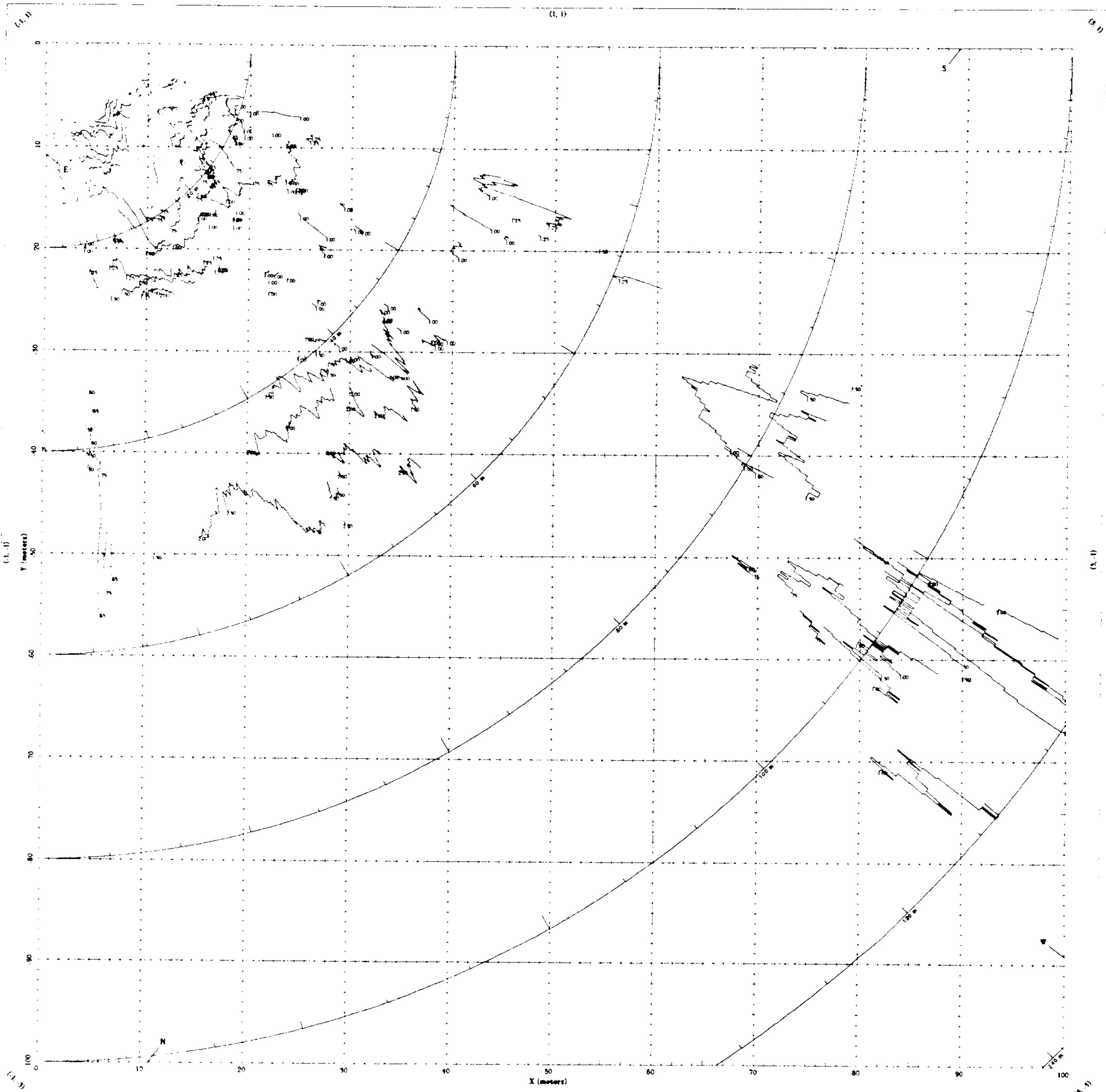
JPL:	Stanford:
L1.RDSC.FRONT VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249 and grant NSG-7538.

OCTOBER 1979



(-1, 1)
(0, 1)
(-3, 1)
(-3, -1)
(1, -1)
(-3, -3)
(1, -3)
(-1, -3)
Y (meters)
X (meters)
E
S
N
W
VIKING LANDER I
SCALE 1 : 200
SHEET (-1, -1)
Range Data Set Files



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 200 SHEET (1, -1)

(Elevations (interval variable) in meters)

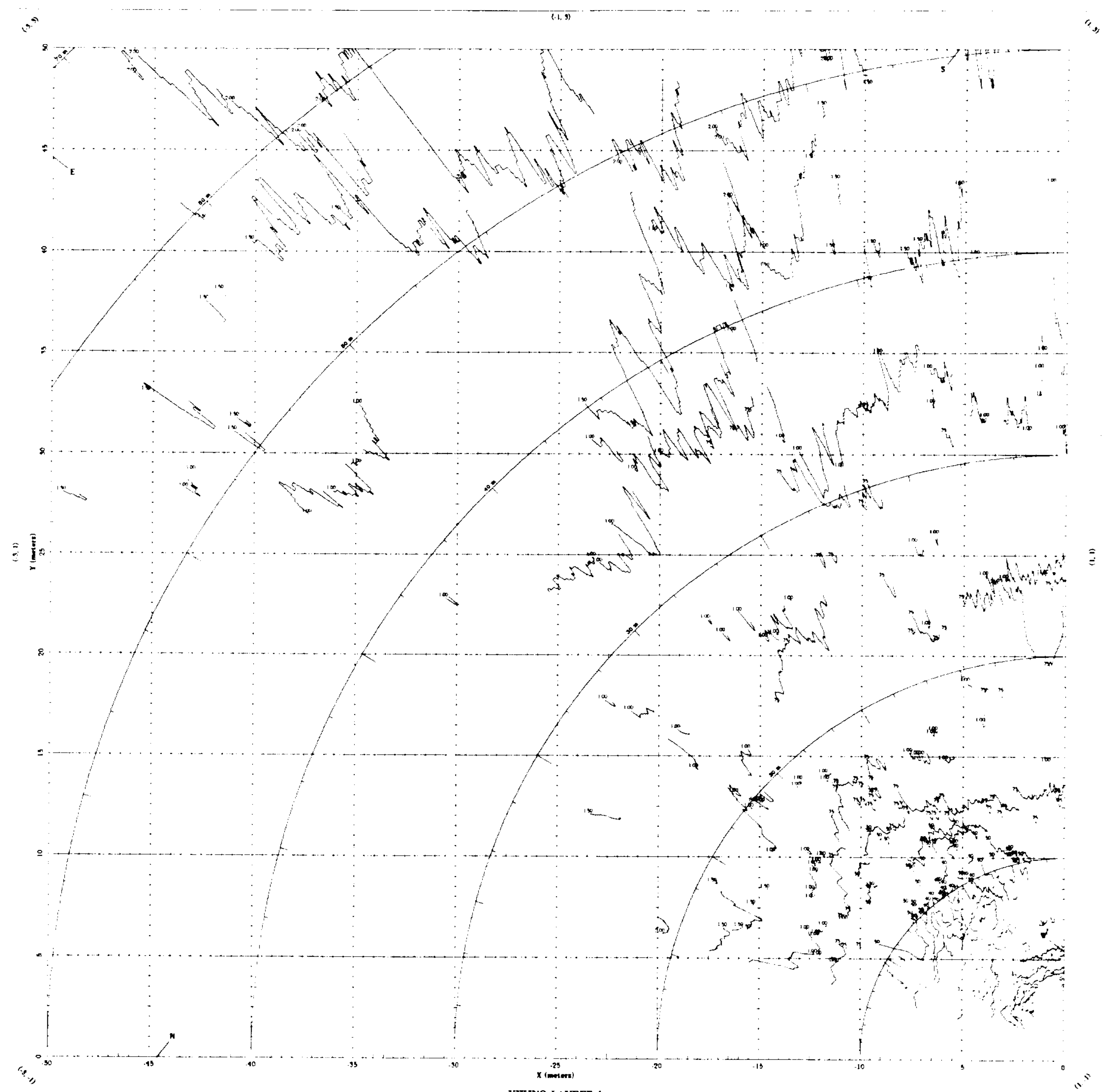
(1, -5)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.V71026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-[illegible] and JPL [illegible], and grant NSG [illegible]

[illegible] OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 100 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

(-1, -1)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-Z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.ROSC.FRONT.V71026	L1CFP
L1.ROSC.EDR.FRONT	L1CFA
L1.ROSC.BACK	L1CBP
L1.ROSC.EDR.BACK	L1CBA

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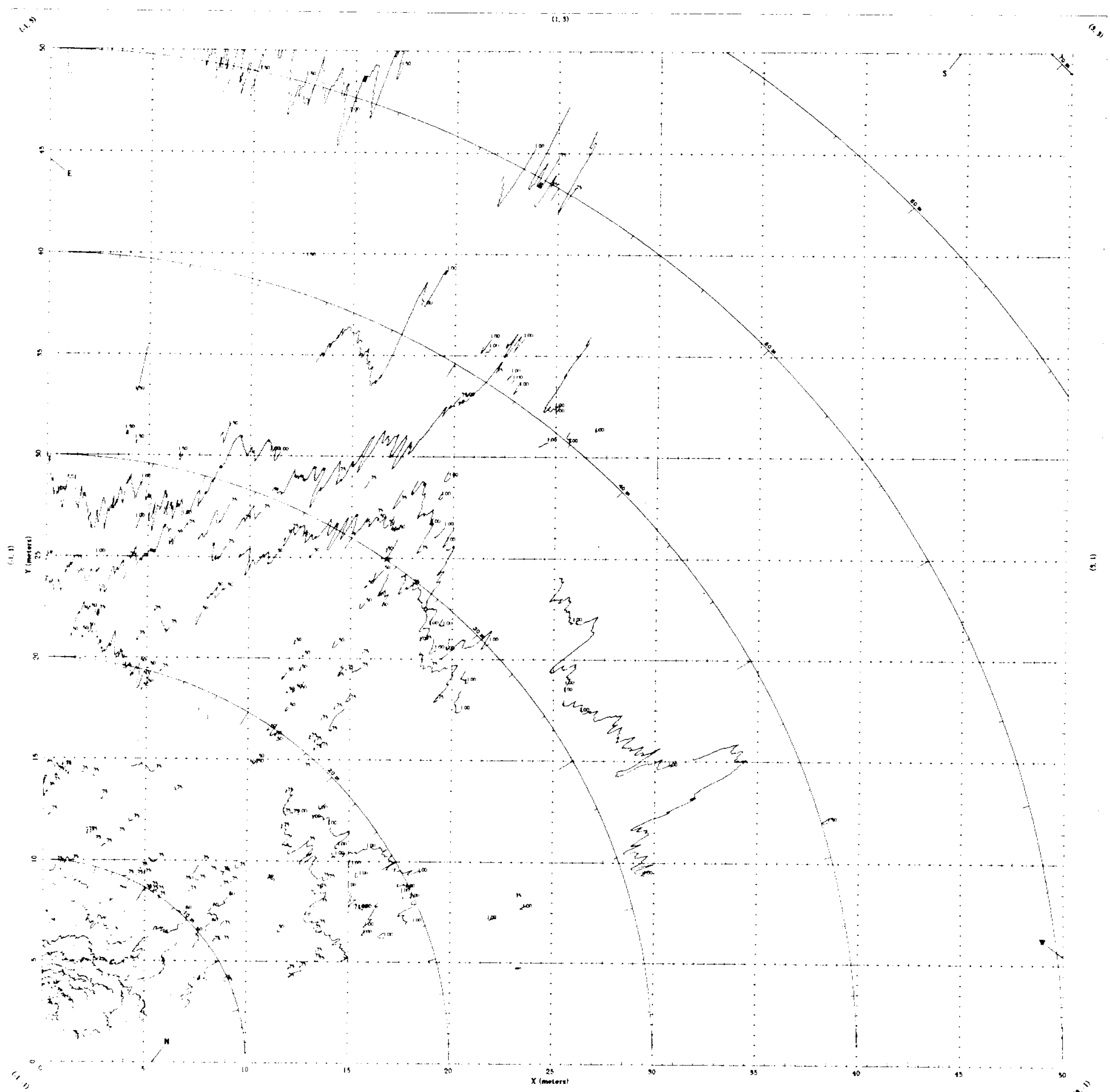
OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 100 SHEET (1, 1)

(Elevations / interval variable) in meters.)

(1, -1)

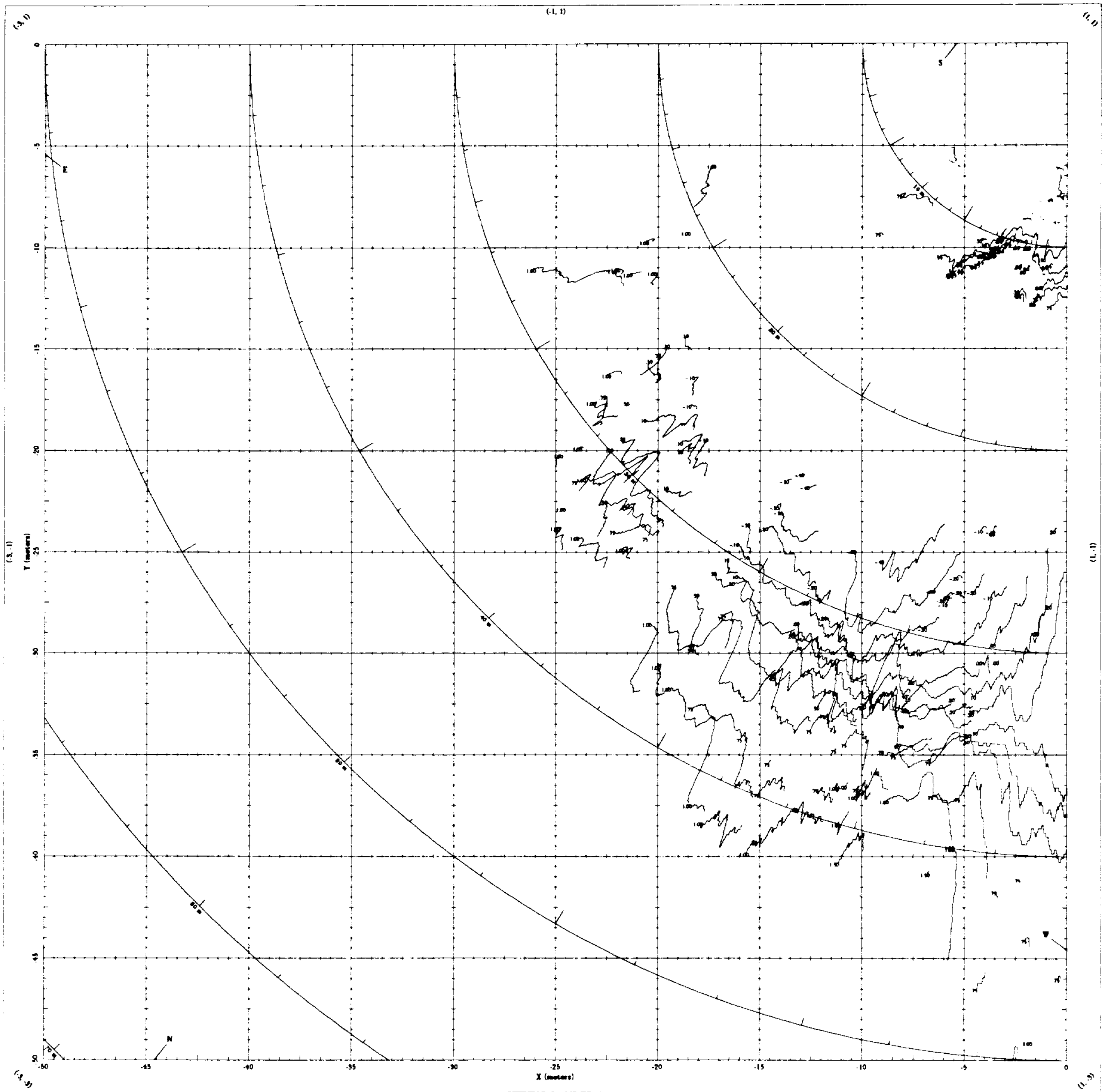
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS x-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract NAS1-9682 and JPL 955249, and grant NSG 7138.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 100 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

(-1, -3)

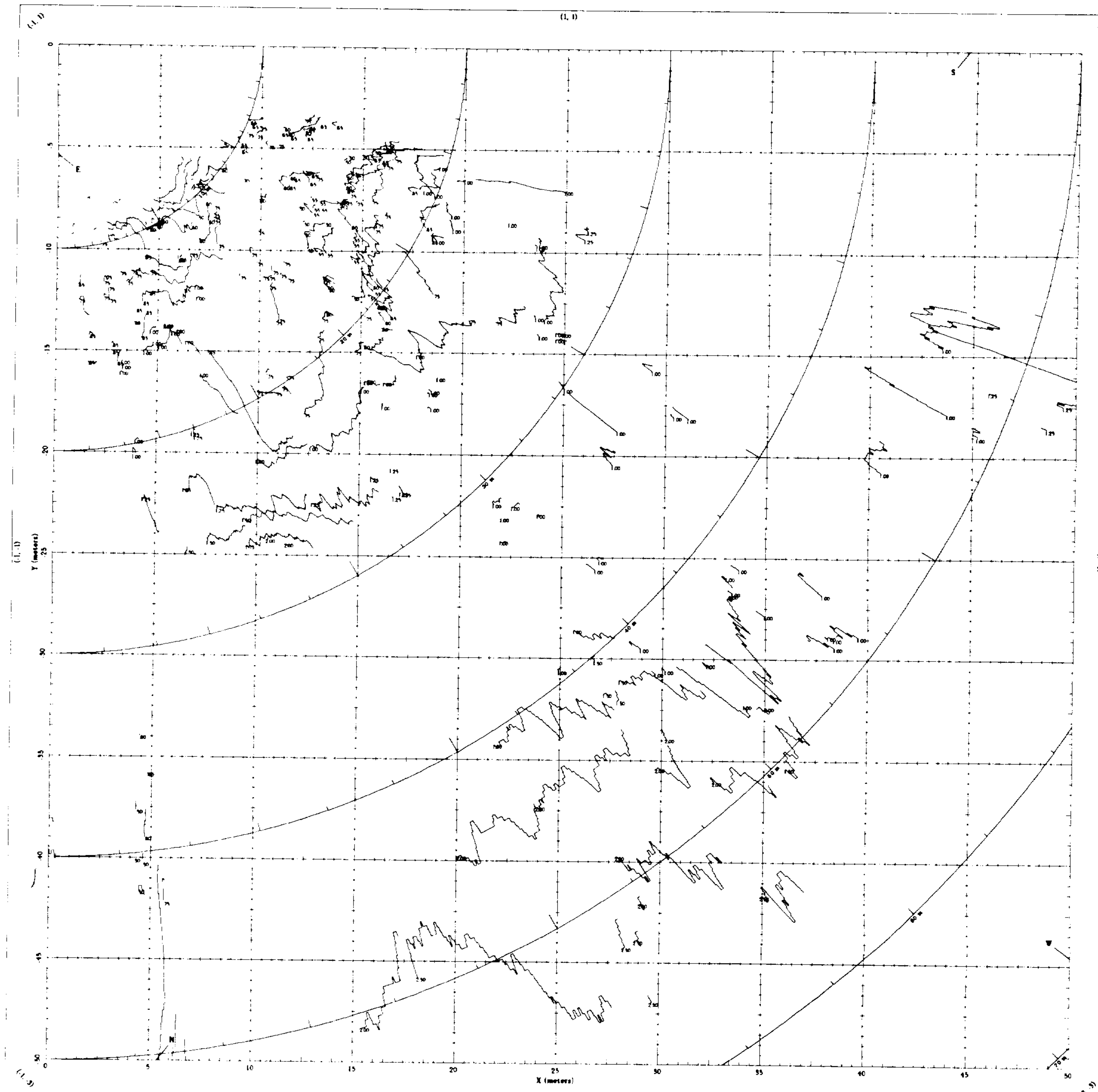
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1085	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9683 and JPL 953249, and grant NSG 7538

082080/1279 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 100 SHEET (1, -1)

(Elevations (interval variable) in meters.)

(1, -5)

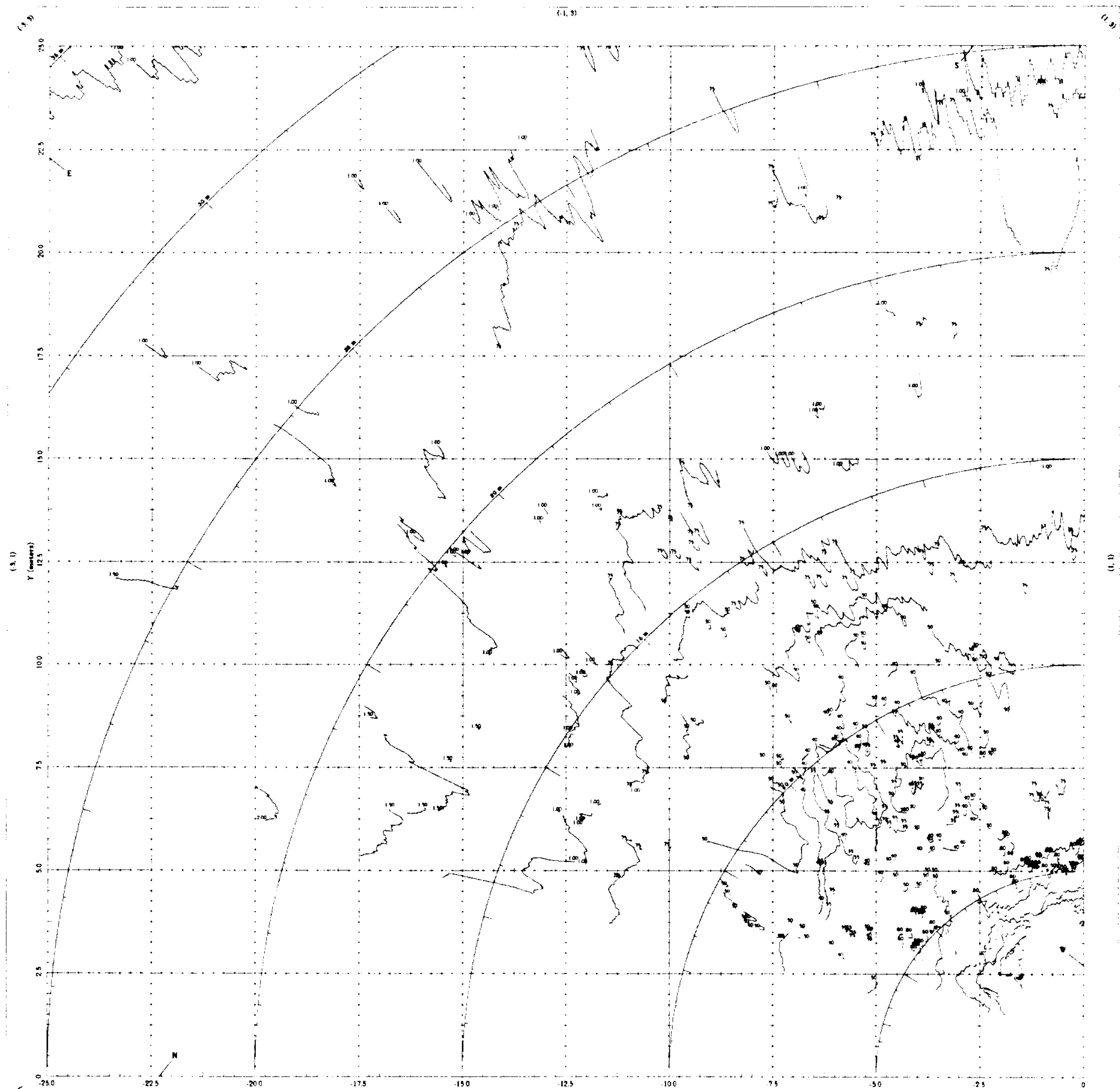
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955349, and grant NSG 7538

082080/1229 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 50 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

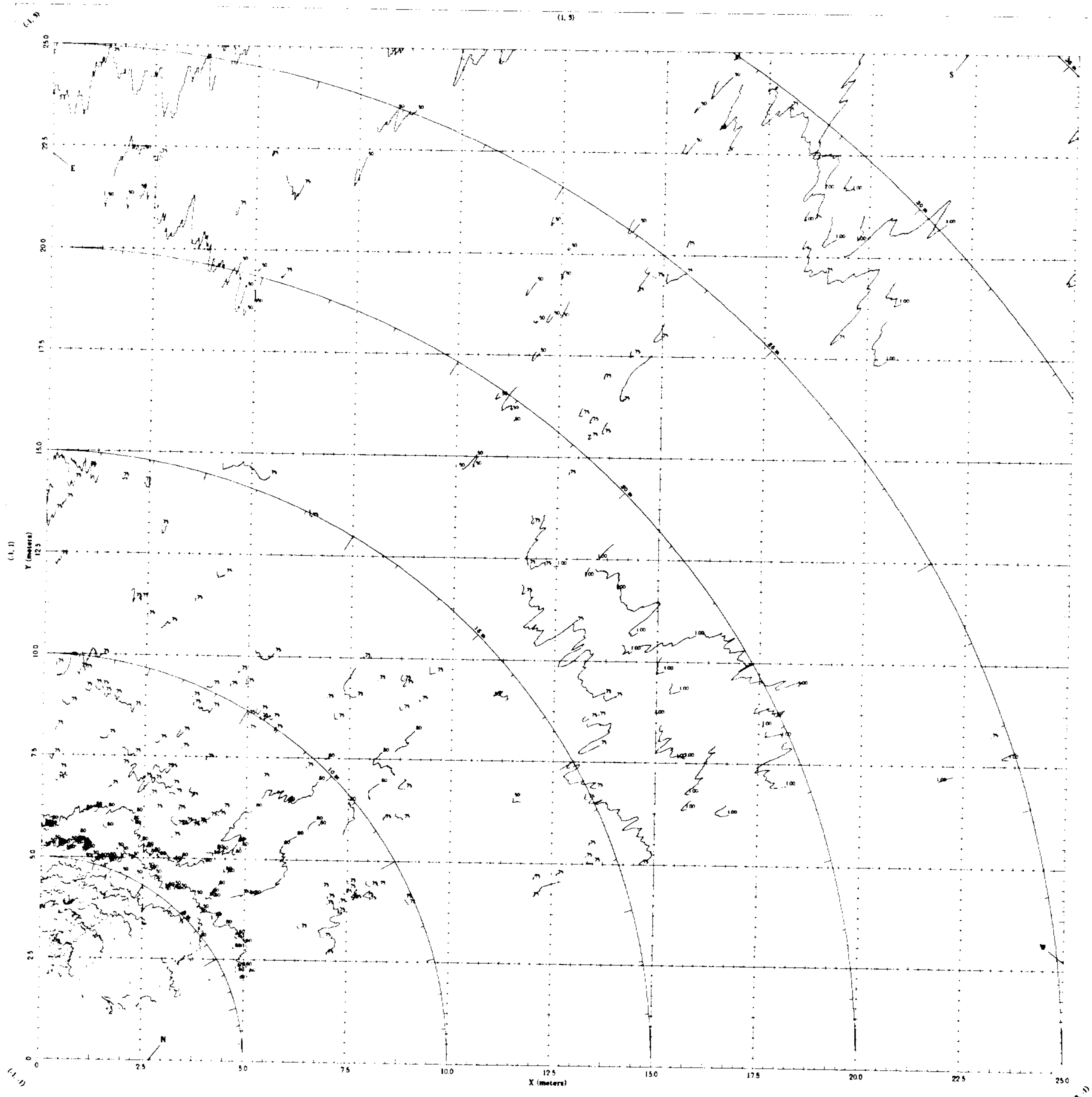
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1029	L1CFP
L1.RDSC.EDR.FRONT	L1CFR
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract NAS1-9687 and JPL 955249, and grant NSG 7538

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 50 SHEET (1, 1)

(Elevations (interval variable) in meters.)

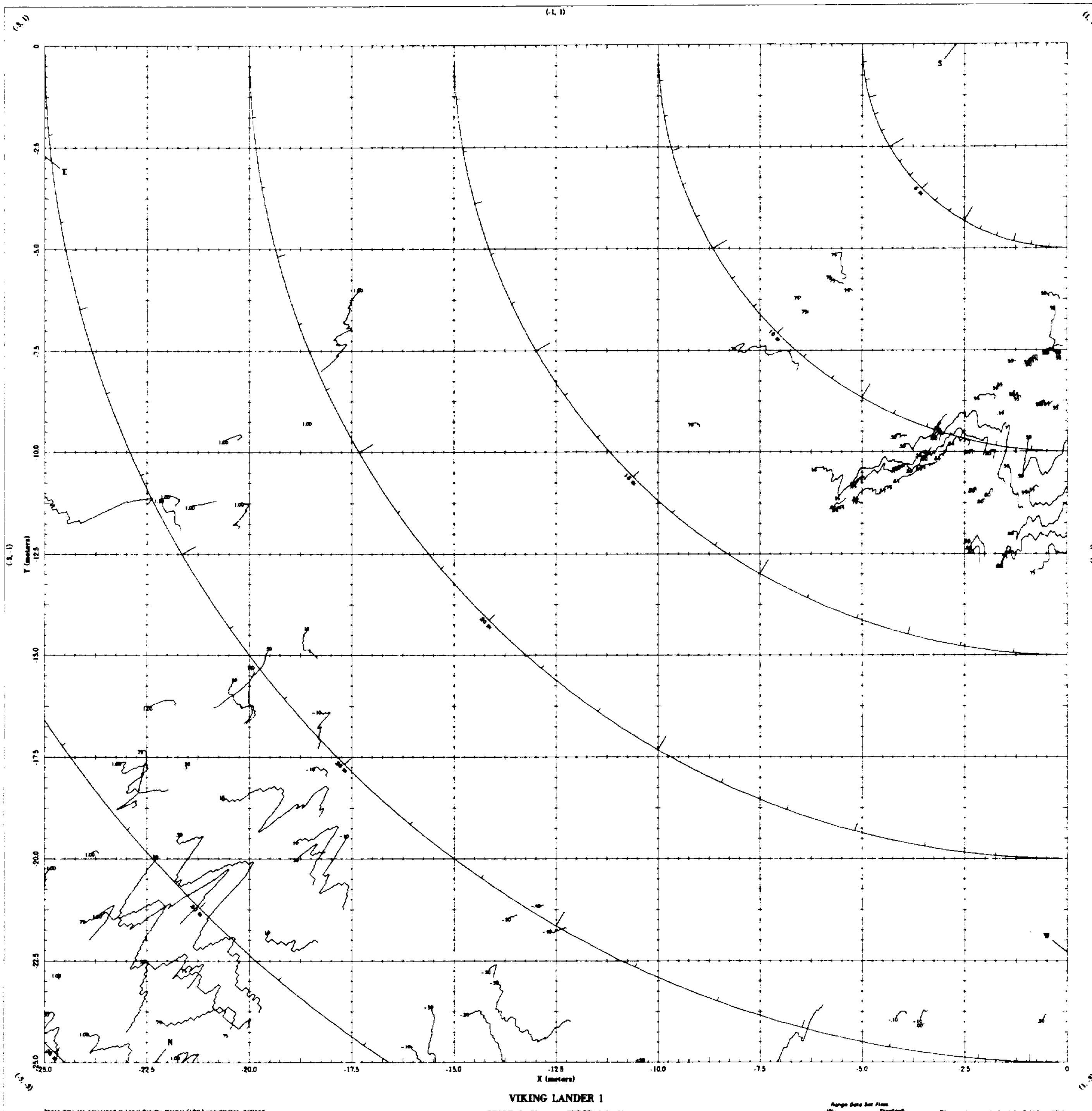
(1, -1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138.

[illegible] OCTOBER [illegible]



VIKING LANDER 1

SCALE 1 : 50 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

(-1, -5)

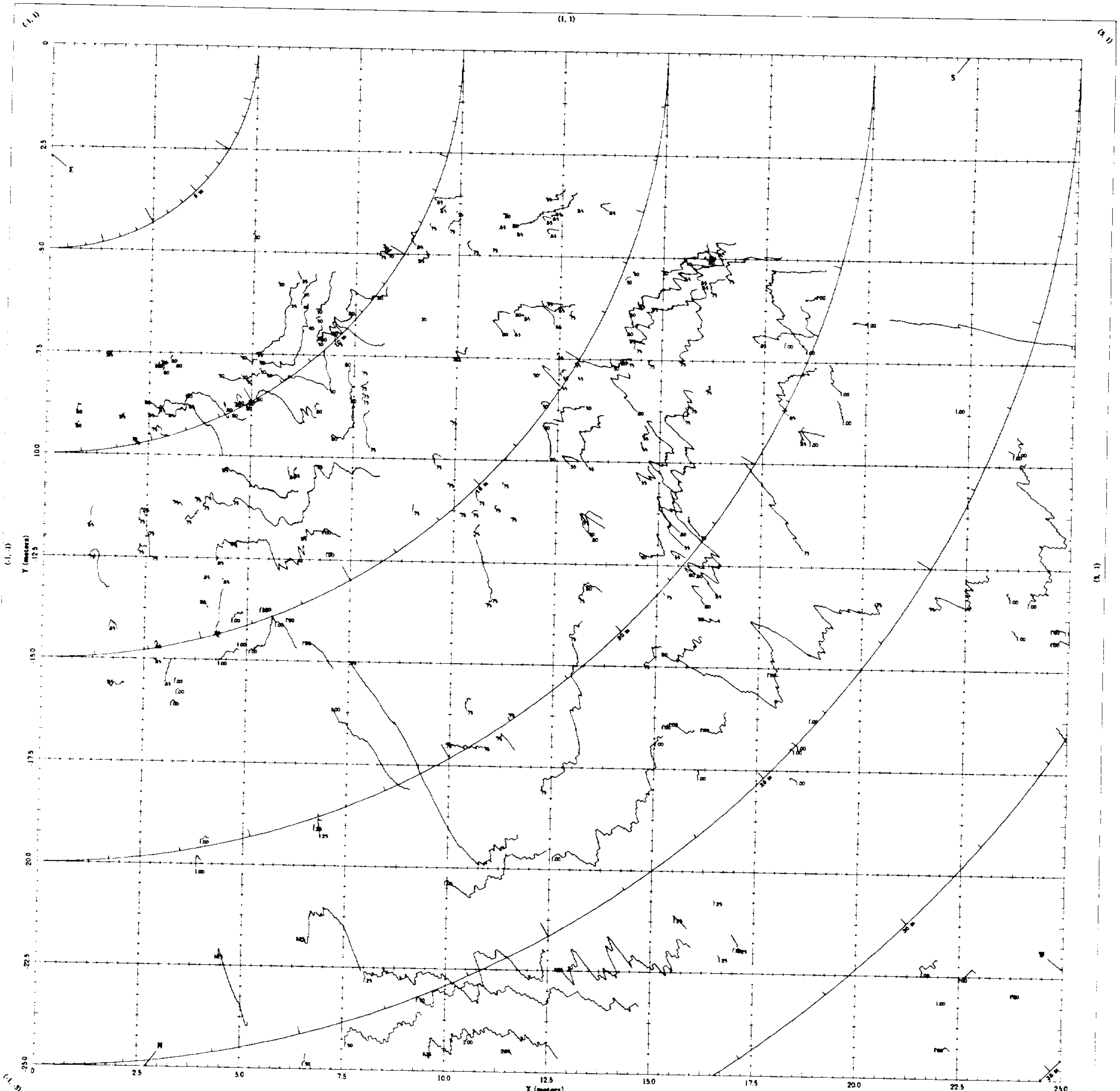
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1 RDSC.FRONT.VT1026	L1CFP
L1 RDSC.EDR.FRONT	L1CFA
L1 RDSC.BACK	L1CBP
L1 RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955349, and grant NSG 7358.

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 50 SHEET (1, -1)

(Elevations (interval variable) in meters.)

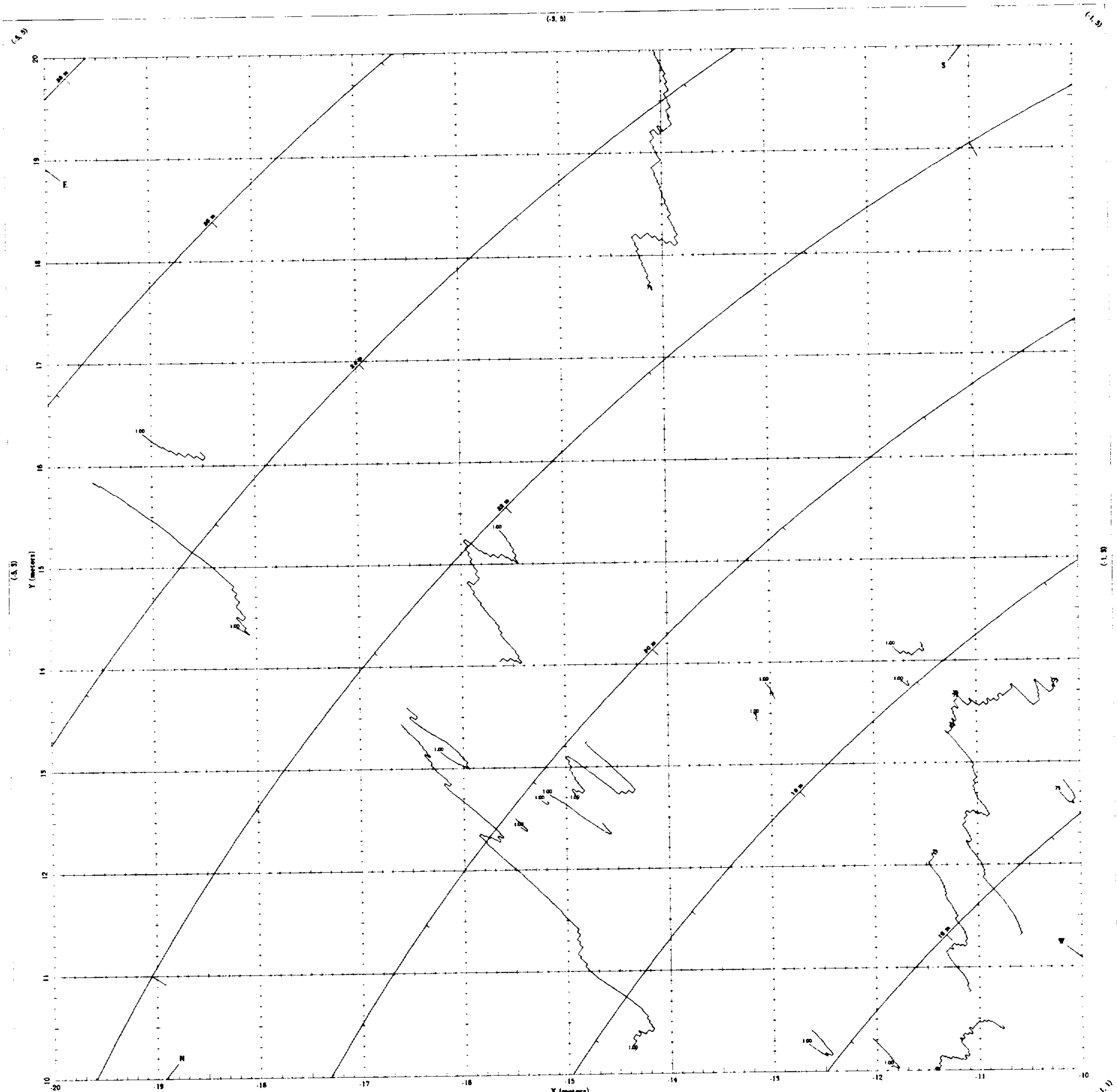
(1, -3)

Range Data Set Files

JPL	Stanford
L1.ADSC.FRONT.VT1026	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7538.

080080/1229 OCTOBER 1978



VIKING LANDER 1

SCALE 1 : 20 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

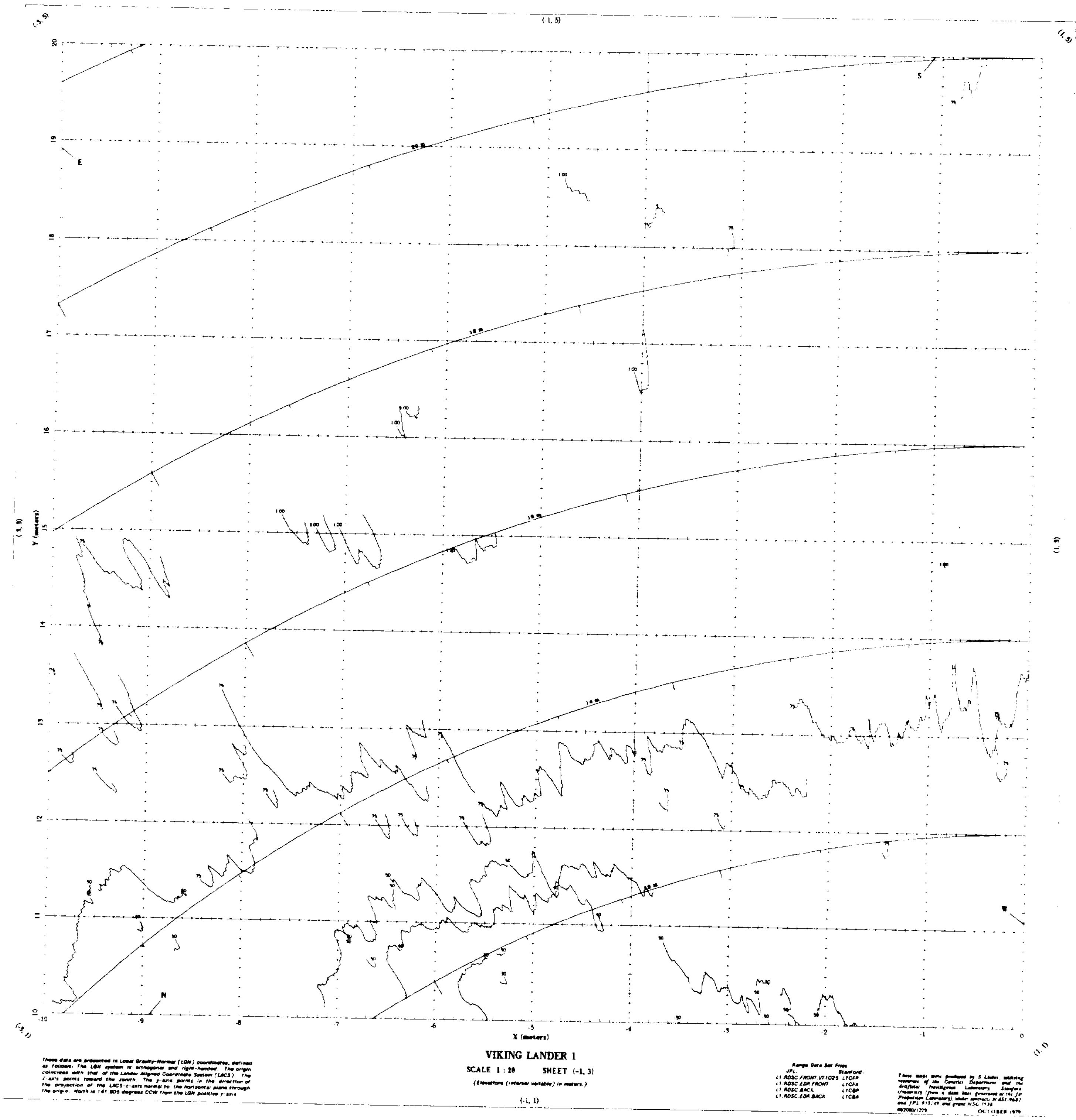
(-3, 1)

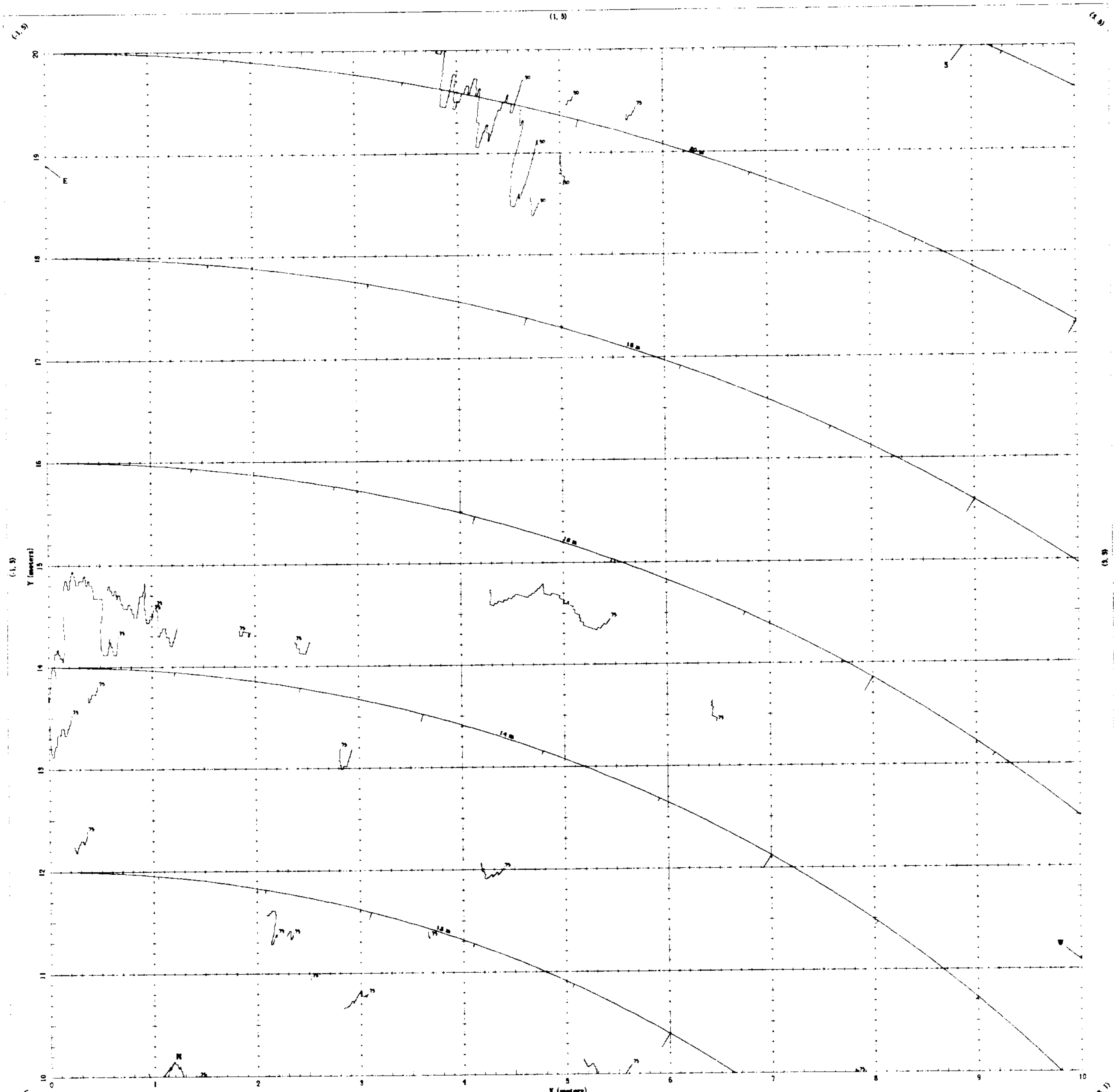
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files	
JPL:	Stanford:
L1.ADSC.FRONT.VT1026	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSC 7938

[illegible] OCTOBER 1979


VIKING LANDER 1
SCALE 1 : 20 SHEET (-1, 3)
(Elevations (interval variable) in meters.)
X (meters)
Y (meters)
(-1, 1)
(-1, 5)
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.
Range Data Set Files
JPL: Stanford:
L1.RDSC.FRONT.VT1025 L1CFP
L1.RDSC.EDR.FRONT L1CFA
L1.RDSC.BACK L1CBP
L1.RDSC.EDR.BACK L1CBA
OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (1, 3)

(Elevations (interval variable) in meters.)

(1, 1)

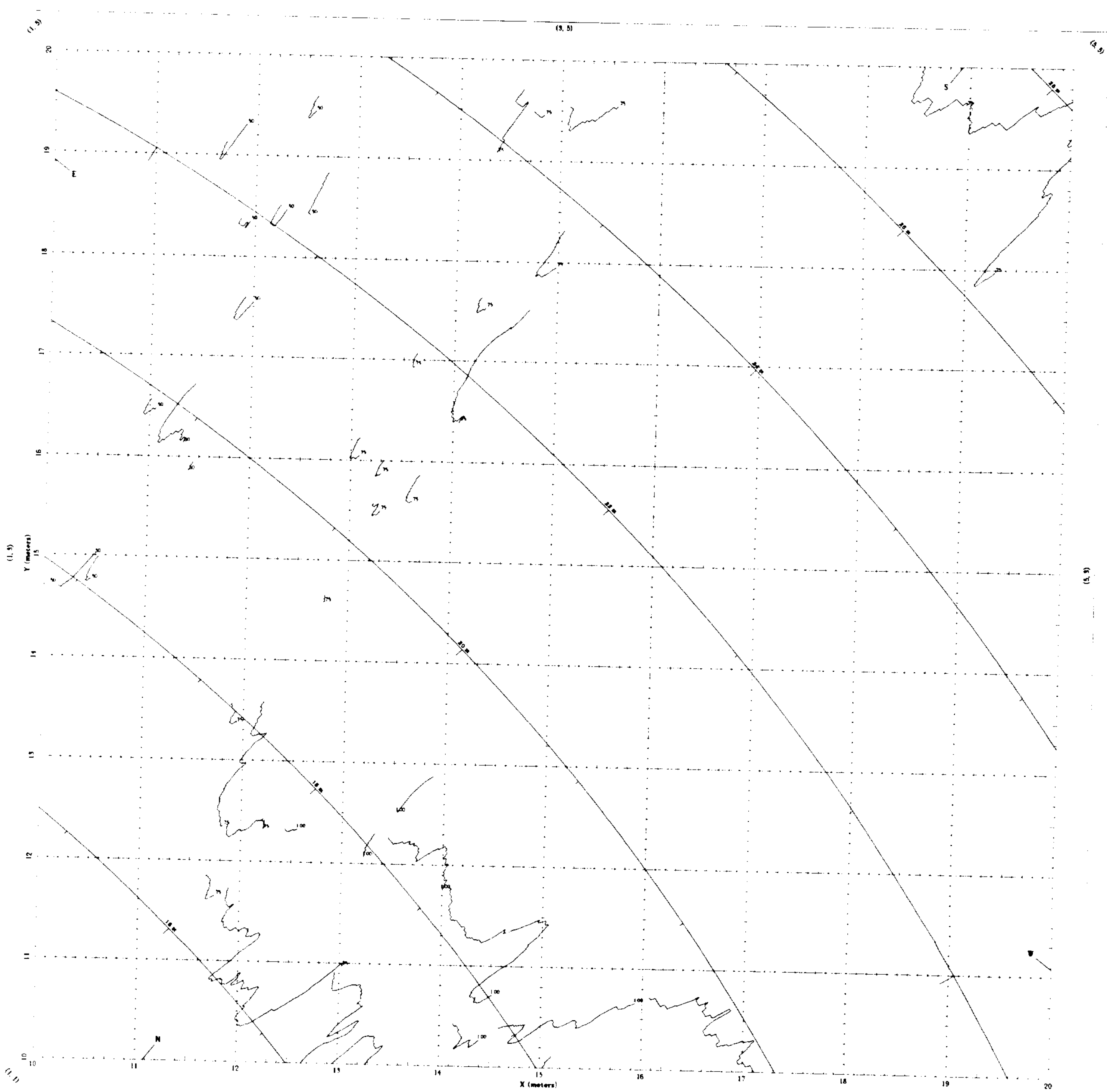
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1D26	L1CFF
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base prepared at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSC 7136

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 20 SHEET (3, 3)

(Elevations (interval variable) in meters.)

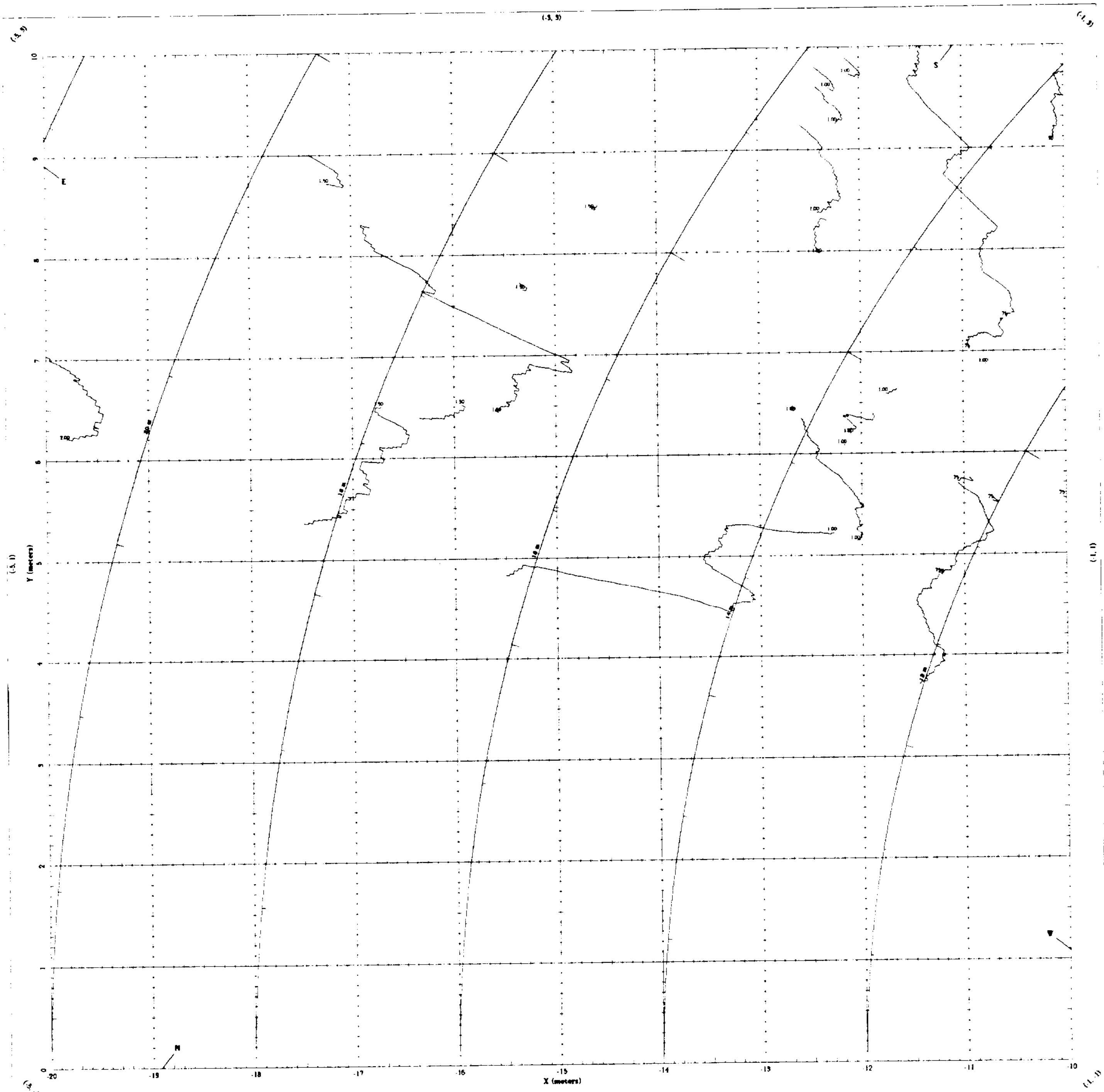
(3, 1)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the JPL Production Laboratory under contracts NAS1-9682 and JPL 955249, and grant NSG-7118.

0870RR1229 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (-3, 1)

(Elevations (interval variable) in meters.)

(-3, -1)

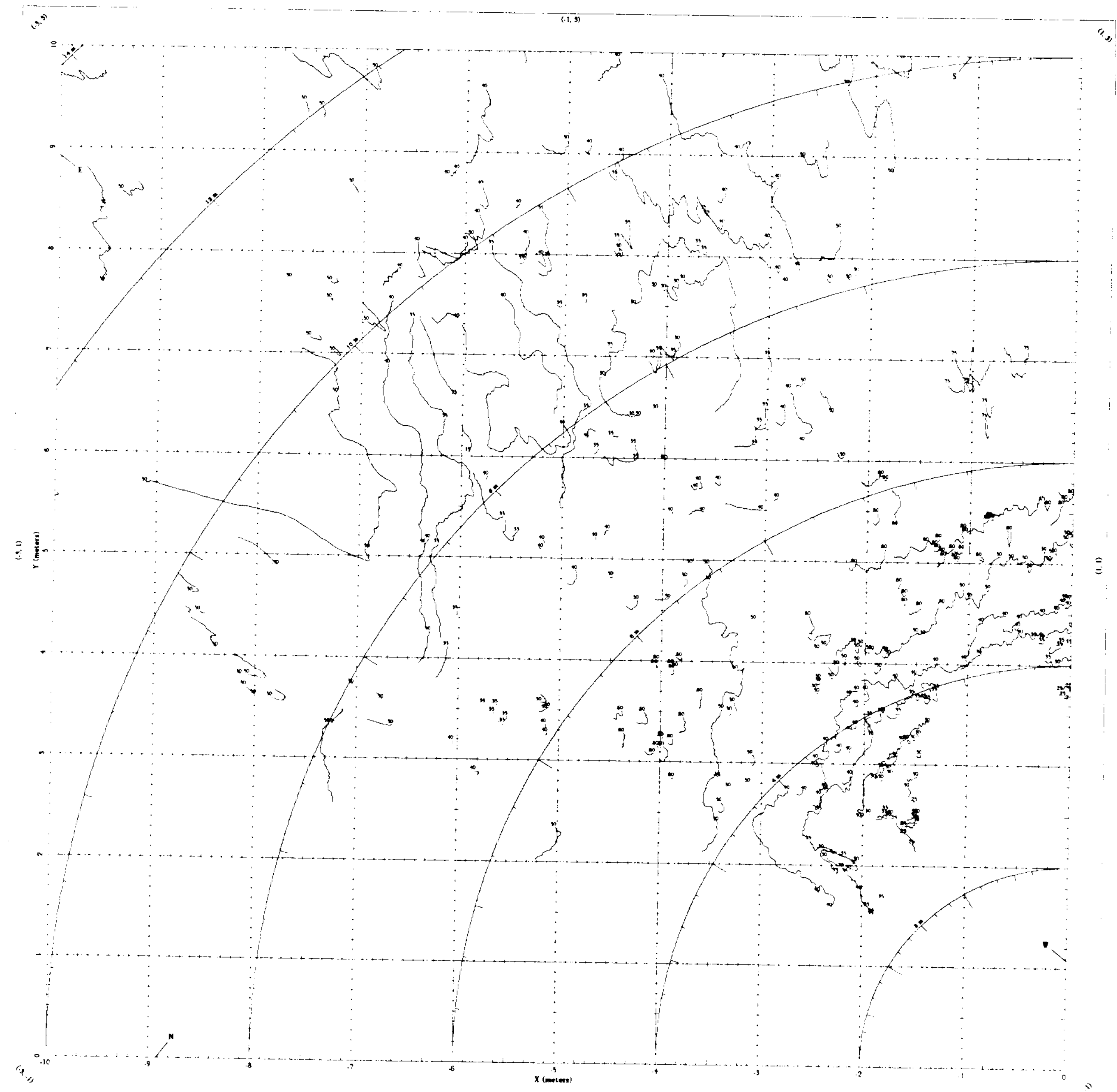
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.ADSC FRONT VT1D29	L1CFP
L1.ADSC EDR FRONT	L1CFA
L1.ADSC BACK	L1CBP
L1.ADSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9683 and JPL 955249, and grant NSG 7138

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 20 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

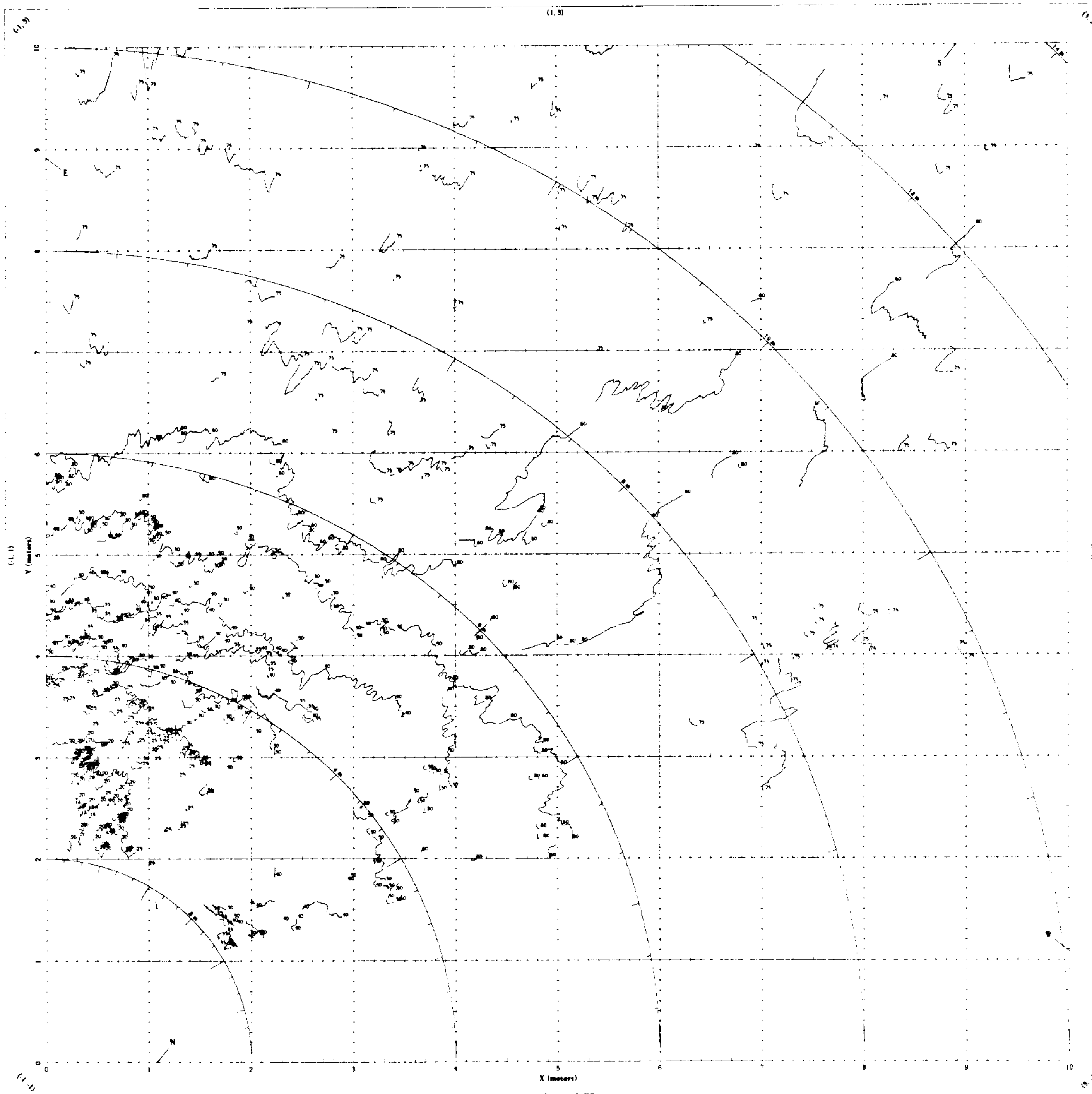
(-1, -1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT V71026	L1CFP
L1.RDSC.EDR FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7338.

[illegible] OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (1, 1)

(Elevations (interval variable) in meters.)

(1, -1)

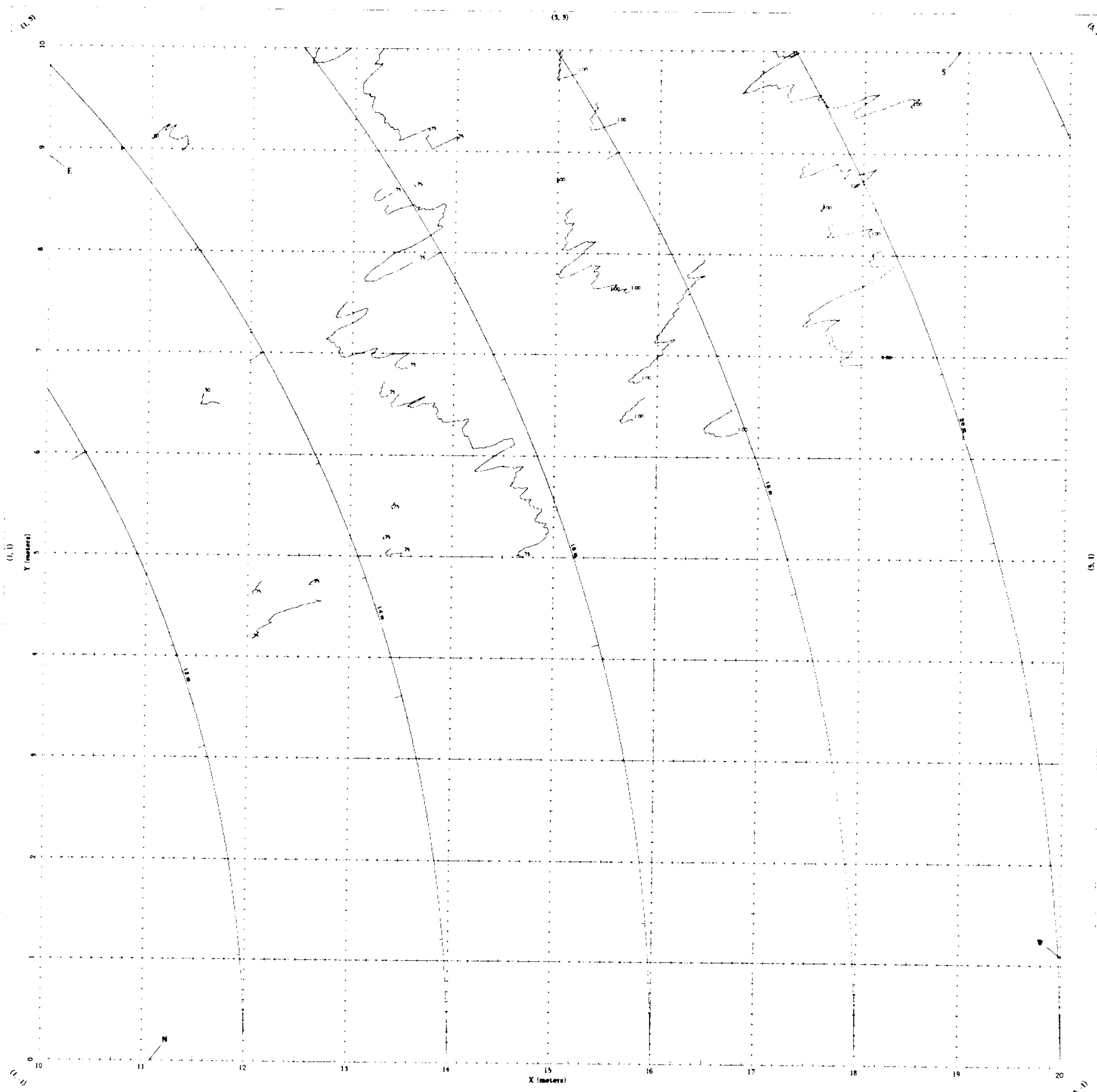
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford:
L1 ADSC FRONT VT1026	L1CFP
L1 ADSC EDR FRONT	L1CFA
L1 ADSC BACK	L1CBP
L1 ADSC EDR BACK	L1CBA

These maps were produced by [illegible], utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1 [illegible] and JPL 955249, and grant NSG [illegible]

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 20 SHEET (3, 1)

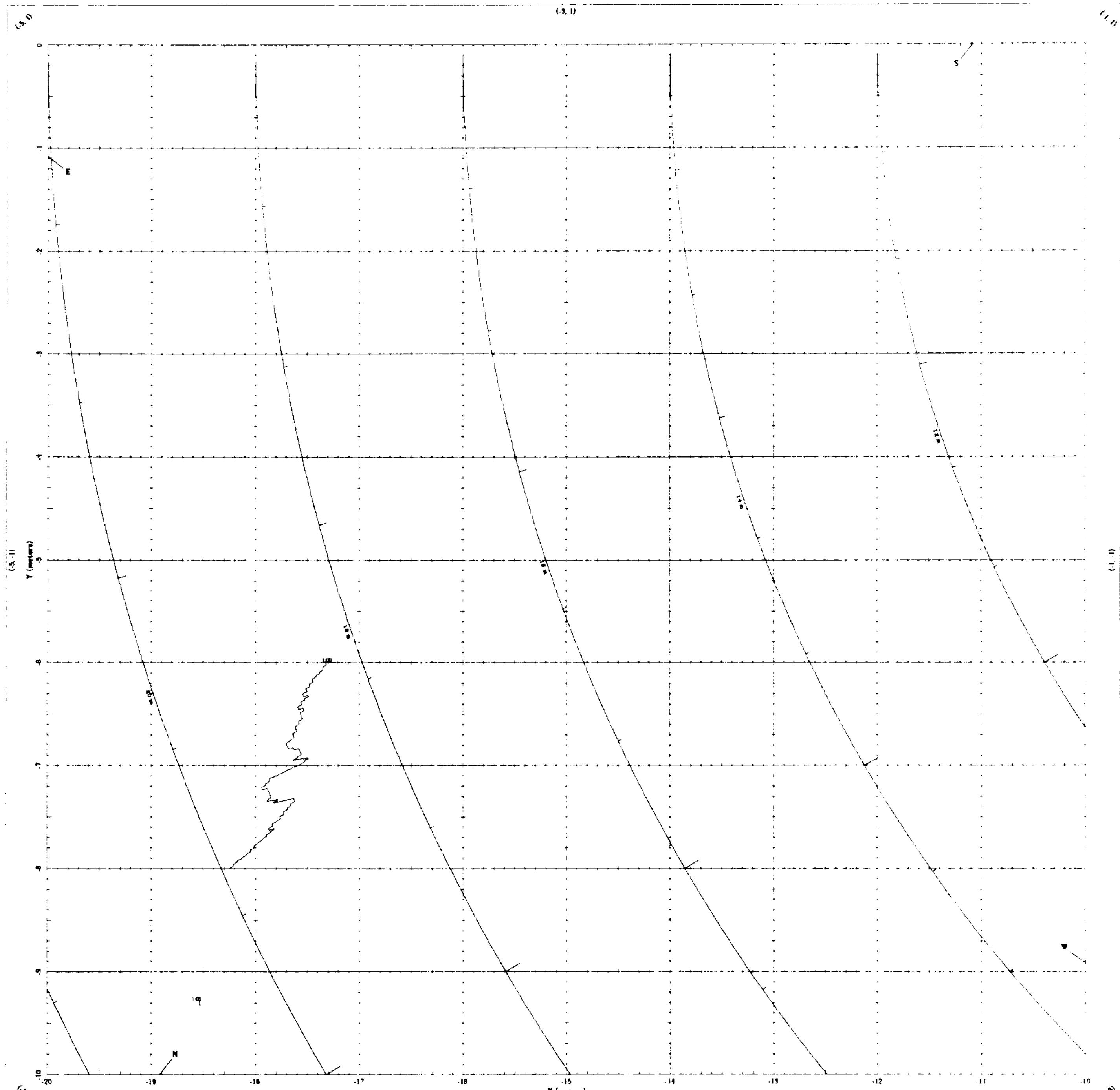
(Elevations (interval variable) in meters.)

(3, -1)

Range Data Set Files

JPL	Stanford
L1.ROSC.FRONT.VT1026	L1CFP
L1.ROSC.EDR.FRONT	L1CFA
L1.ROSC.BACK	L1CBP
L1.ROSC.EDR.BACK	L1CBA

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (-3, -1)

(Elevations (interval variable) in meters.)

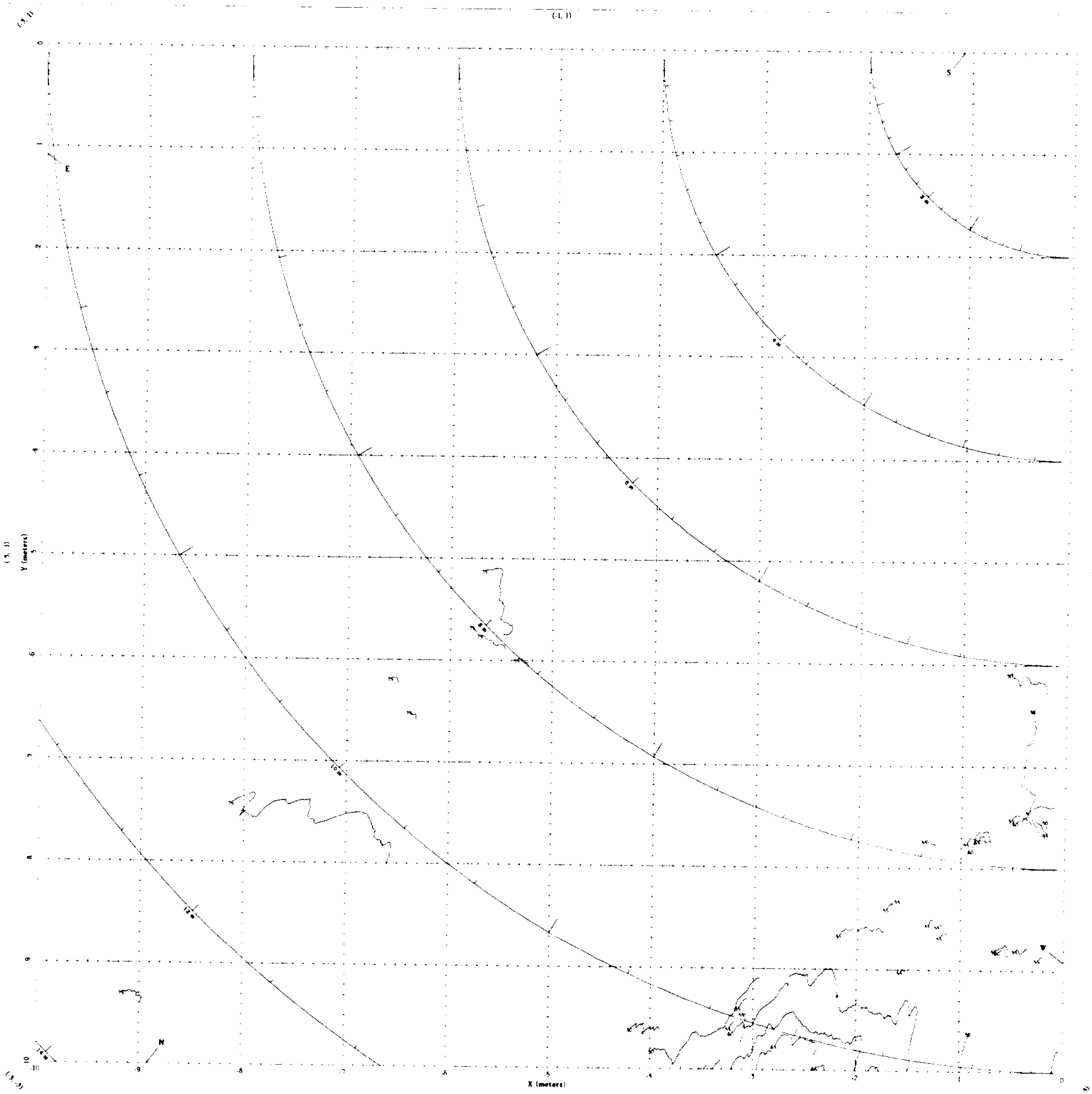
(-3, -3)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.ADSC.FRONT.VT1G26	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 953249 and grant [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 20 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

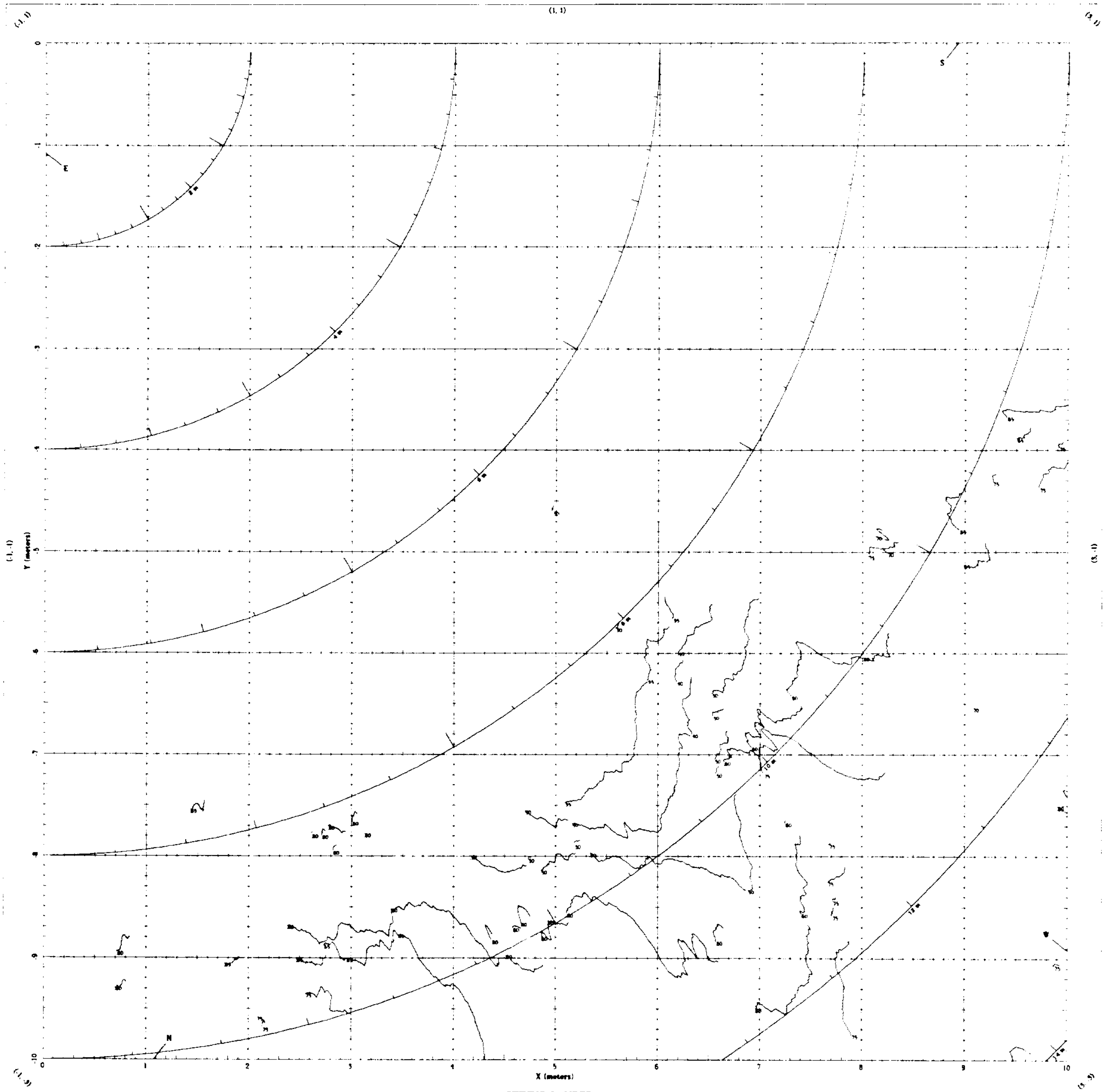
(-1, -3)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory under contracts [illegible] and JPL [illegible] and grant [illegible]

OCTOBER [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 20 SHEET (1, -1)

(Elevations (interval variable) in meters.)

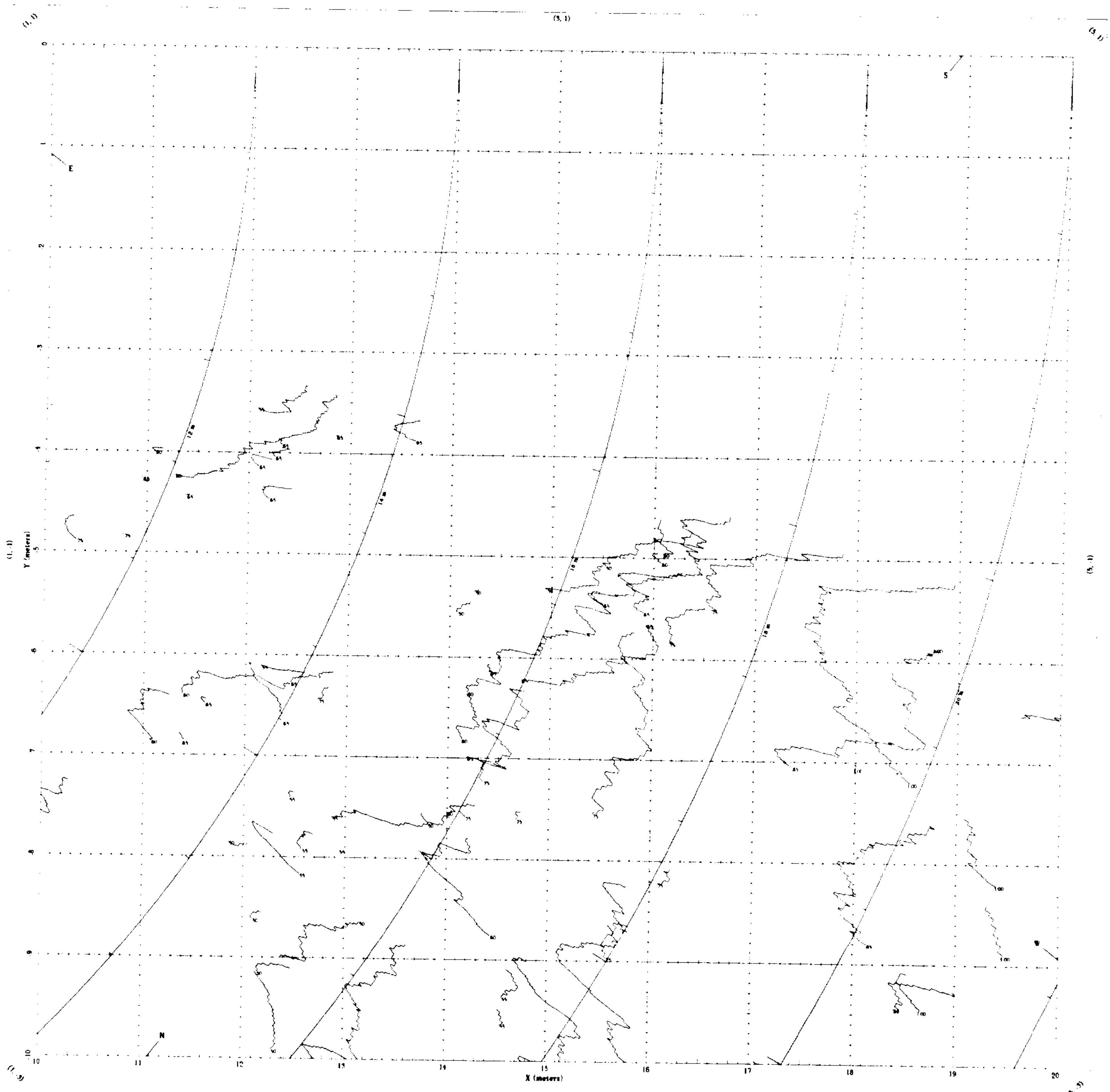
(1, -3)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT VT1026	L1CFP
1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7338

[illegible] OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (3, -1)

(Elevations (interval variable) in meters.)

(3, -3)

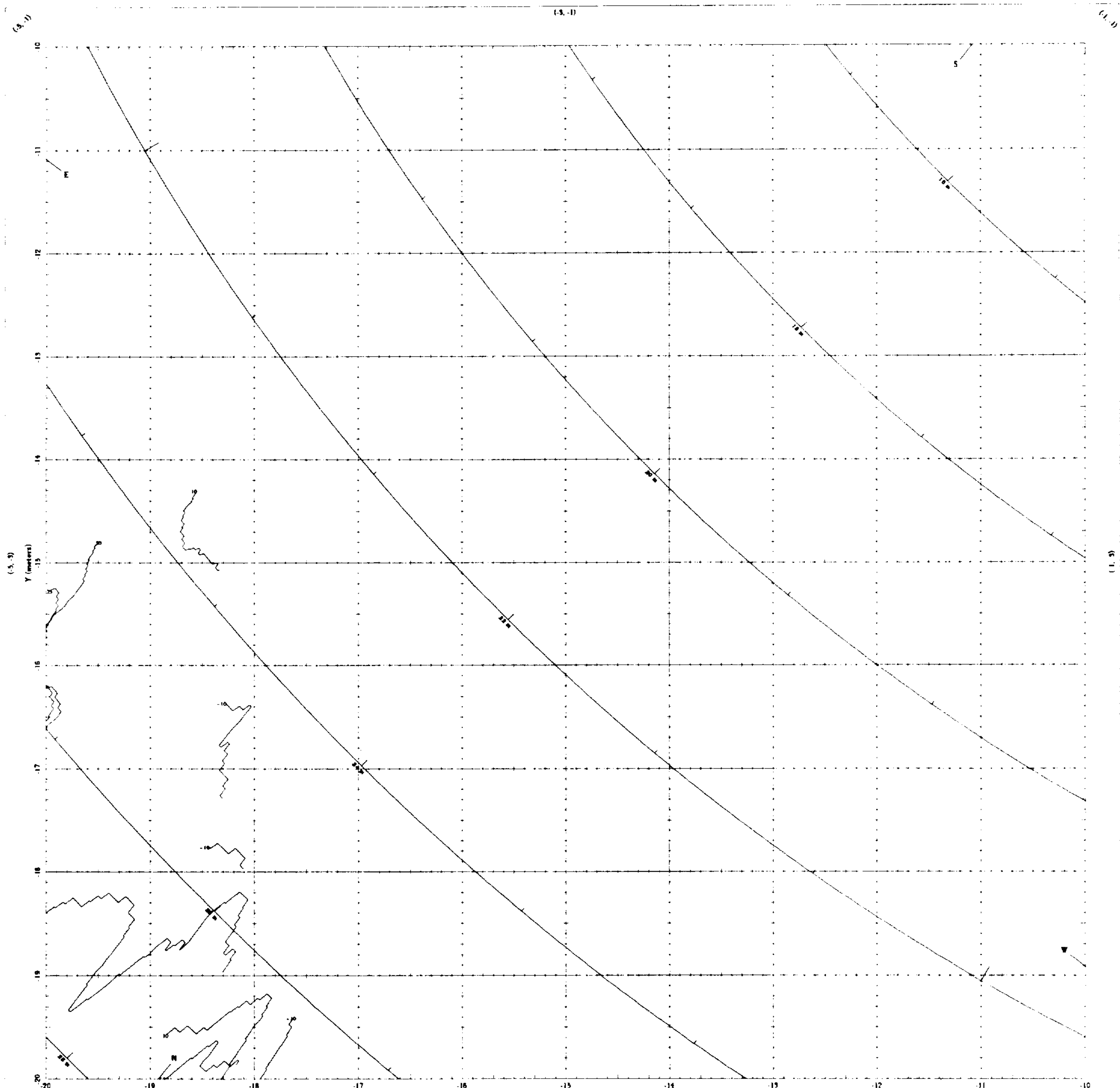
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 143.906 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7338.

062080/1779 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (-3, -3)

(Elevations (interval variable) in meters)

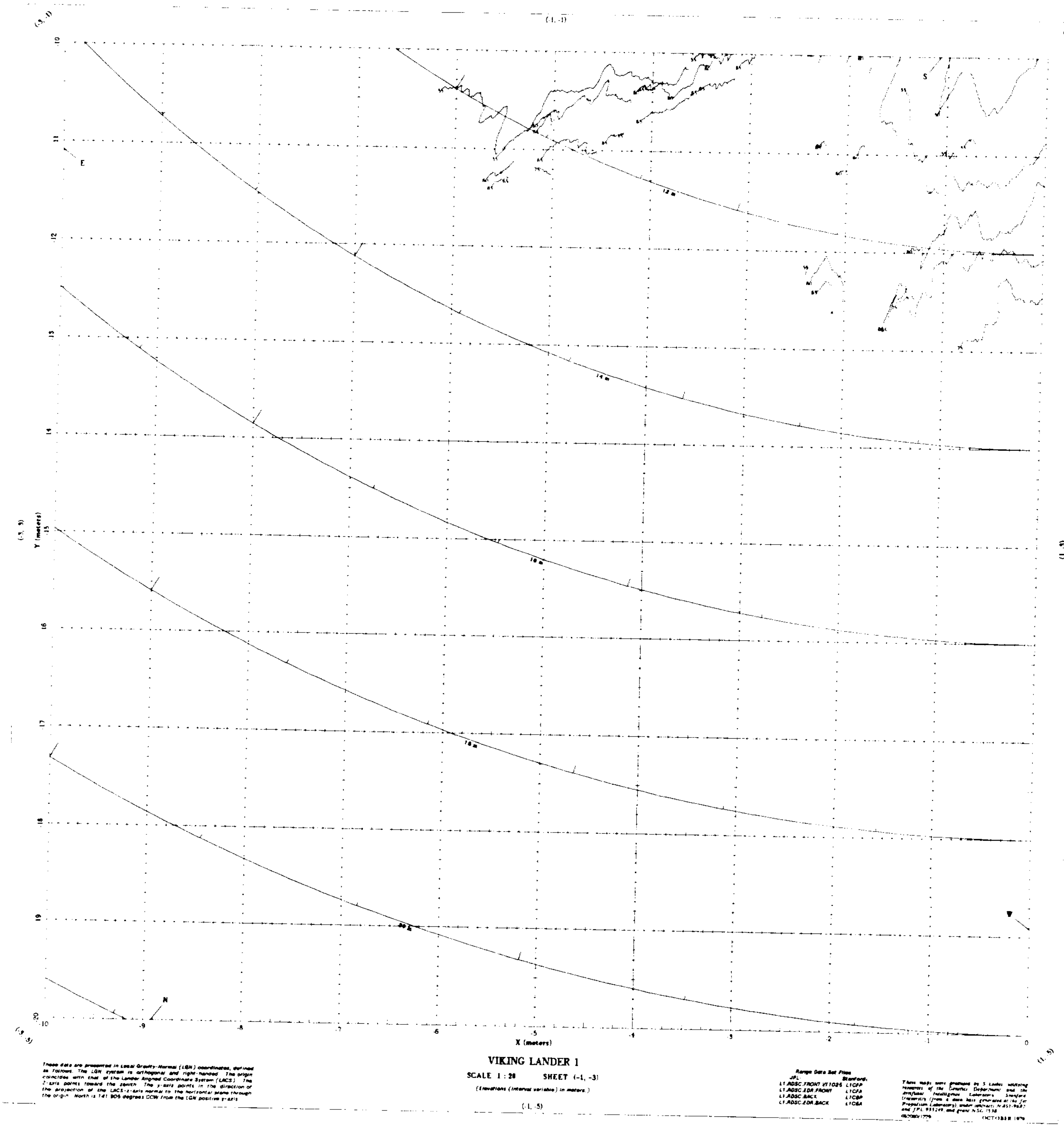
(-3, -5)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

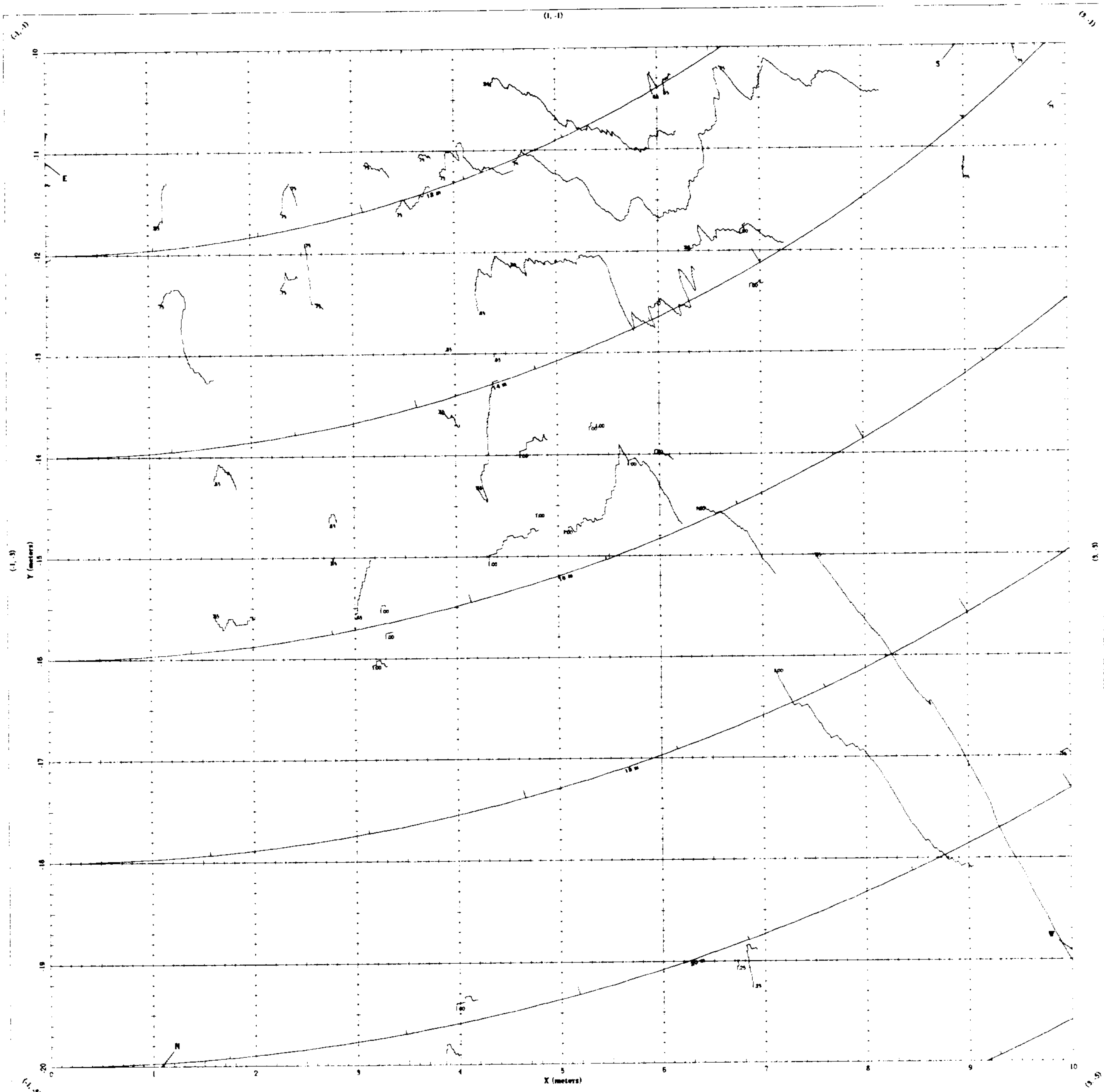
Range Data Set Files	
JPL	Stanford
L1 RDSC FRONT #T1026	L1CFP
L1 RDSC EDR.FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the General Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract NAS1-9683 and JPL 953749, and grant NSG-7318.

062980-1279 OCTOBER 1979



X (meters)
Y (meters)
12 m
14 m
16 m
18 m
20 m
N
E
S
W
VIKING LANDER 1
SCALE 1 : 20
SHEET (-1, -3)
(Elevations (interval variable) in meters.)
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.
Range Data Set Files
JPL: Stanford:
L1.RDSC.FRONT.VT1025 L1CFP
L1.RDSC.EDR.FRONT L1CFA
L1.RDSC.BACK L1CBP
L1.RDSC.EDR.BACK L1CBA
OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20 SHEET (1, -3)

(Elevations (interval variable) in meters.)

(1, -5)

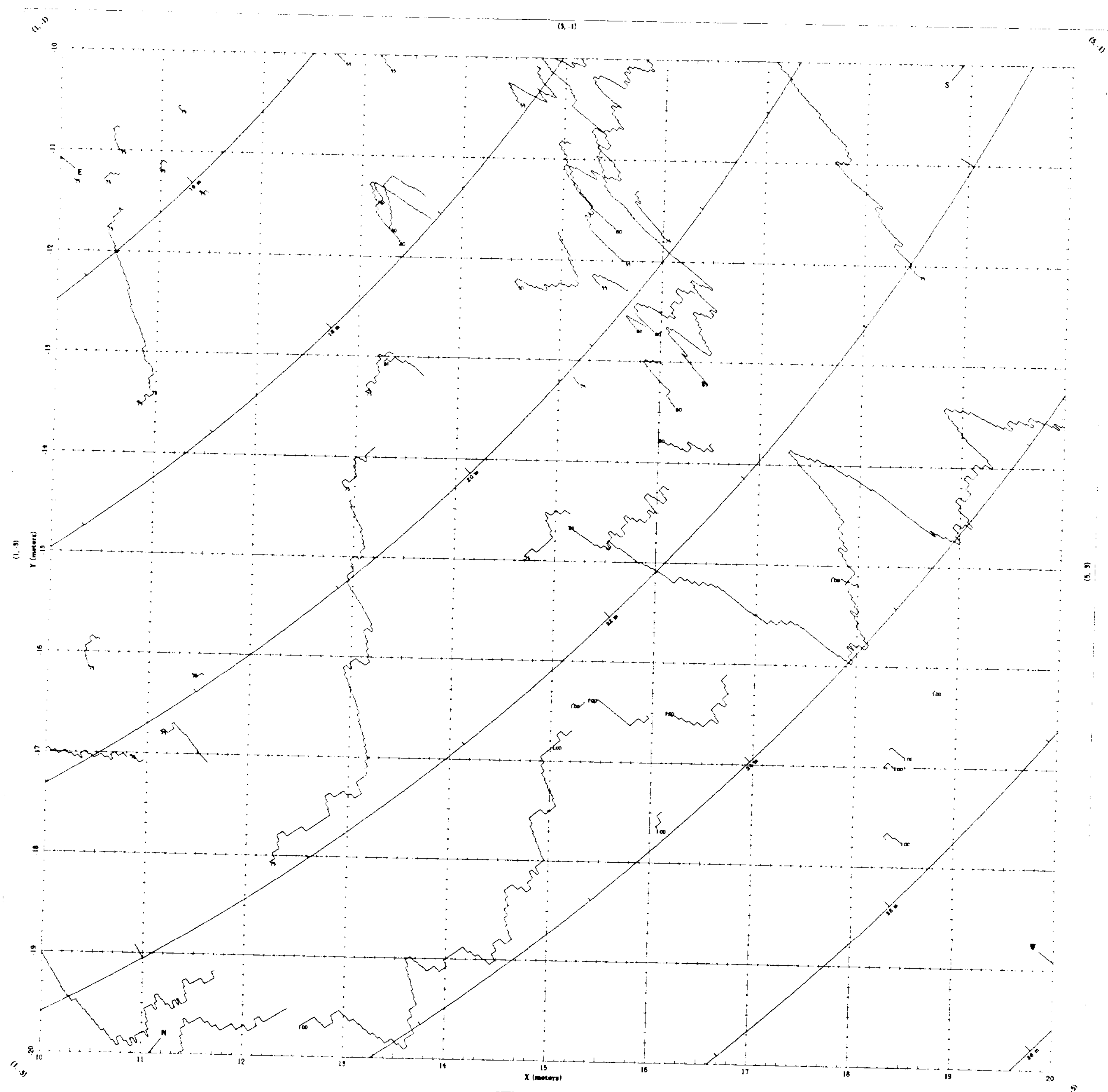
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249 and grant NSG 7336.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 20   SHEET (3, -3)

(Elevations (interval variable) in meters.)

(3, -5)

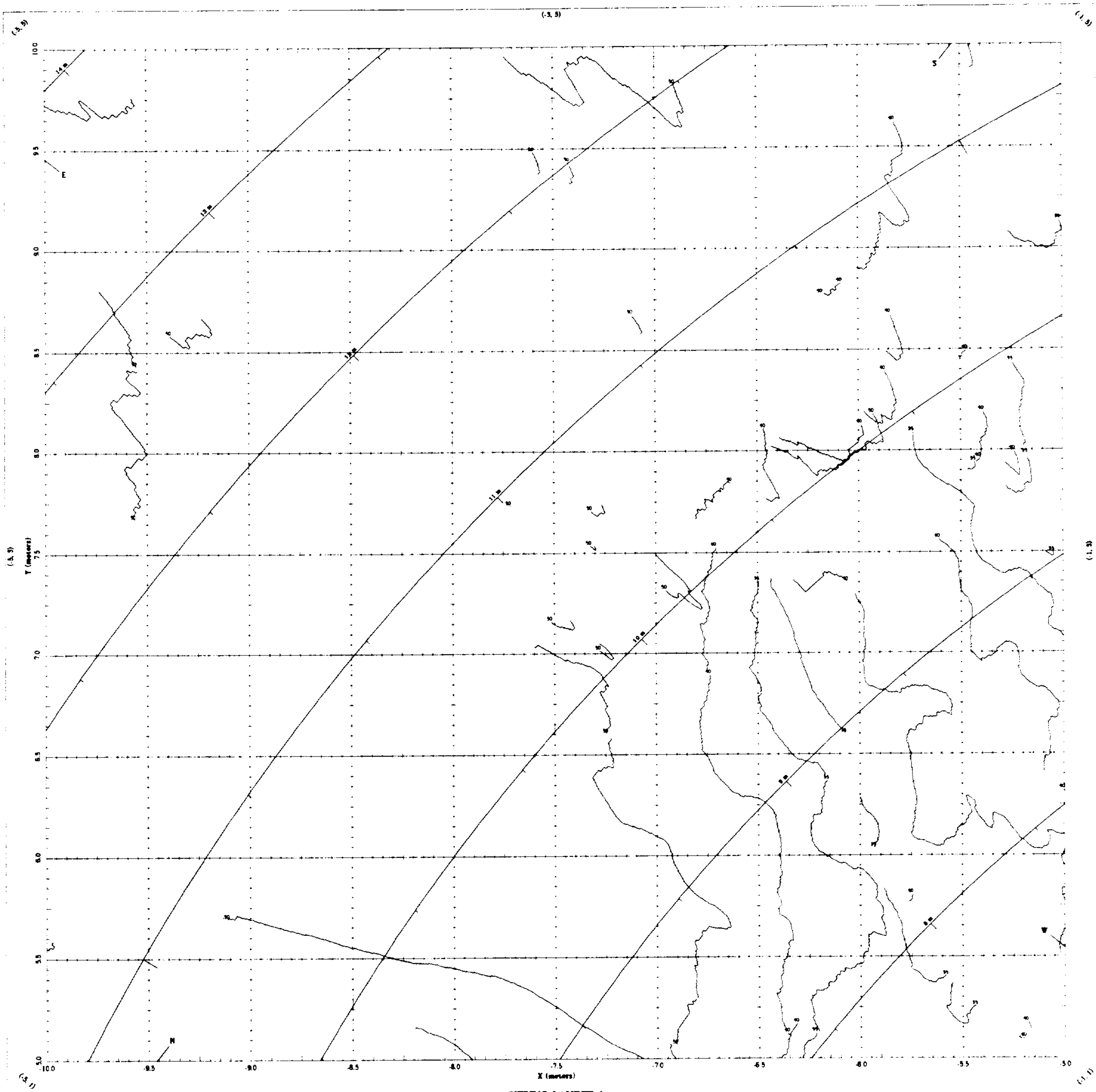
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.V71026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing facilities of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 10 SHEET (-3, 3)

(Elevations (Interval variable) in meters.)

(-3, 1)

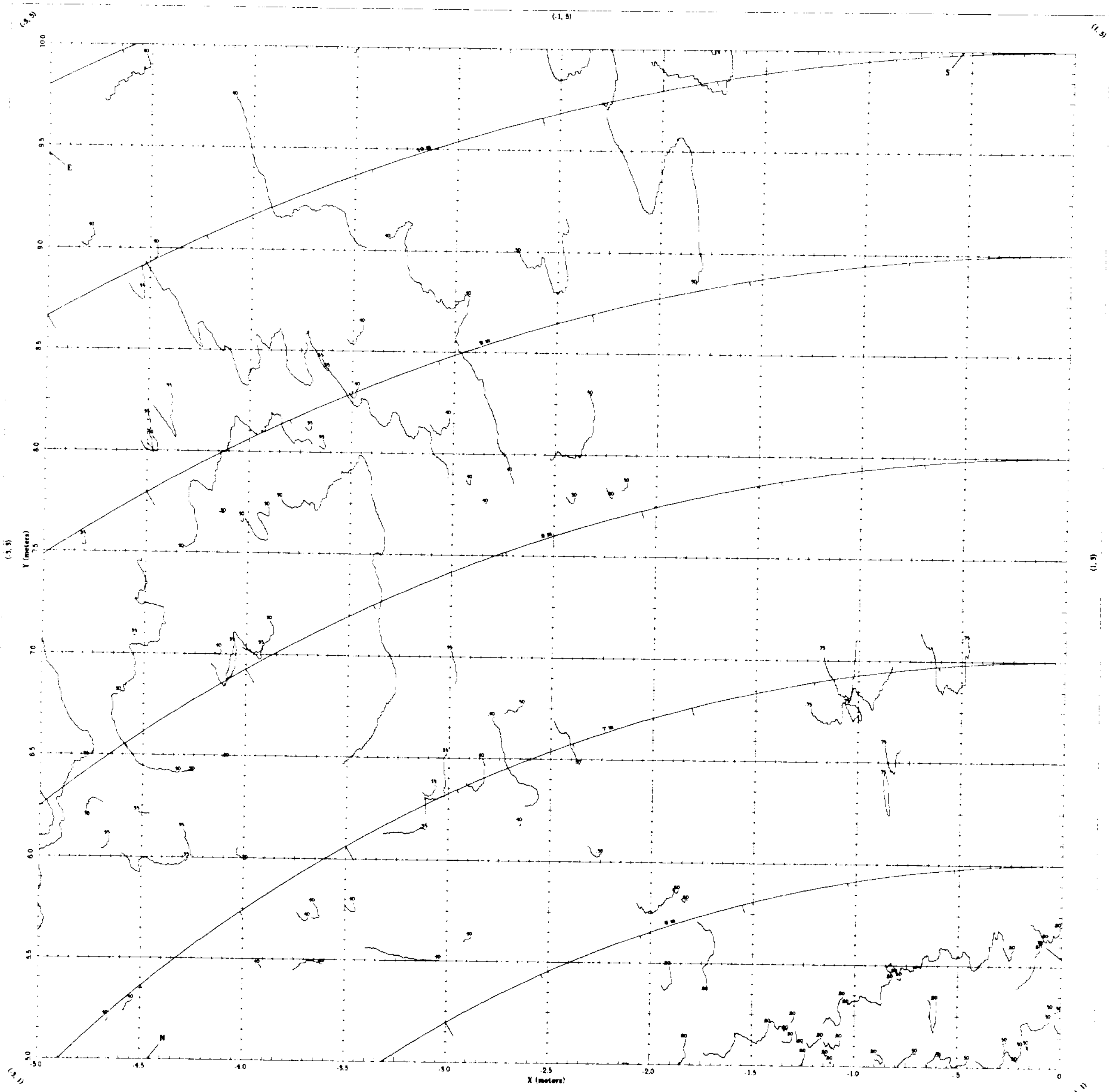
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 161.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1025	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by J. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249, and grant NSG 7538.

[illegible] OCTOBER 1976



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 147.808 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (-1, 3)

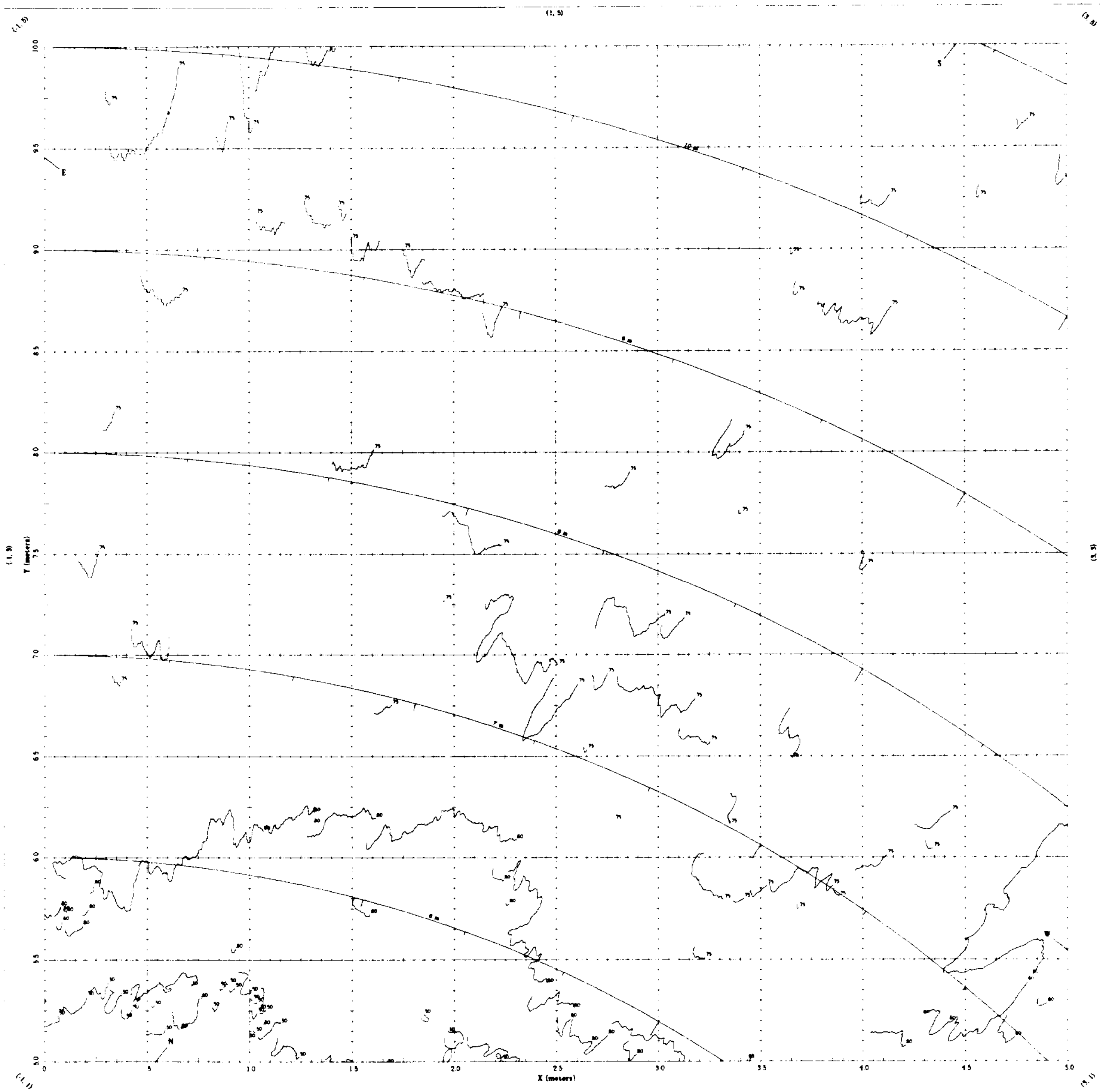
(Elevations (interval variable) in meters.)

(-1, 1)

Range Data Set Files JPL	Stanford:
L1 ROSC.FRONT.VT1026	L1CFF
L1 ROSC.EDR.FRONT	L1CFA
L1 ROSC.BACK	L1CBP
L1 ROSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7138

082080/1229 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 10 SHEET (1, 3)

(Elevations (interval variable) in meters.)

(1, 1)

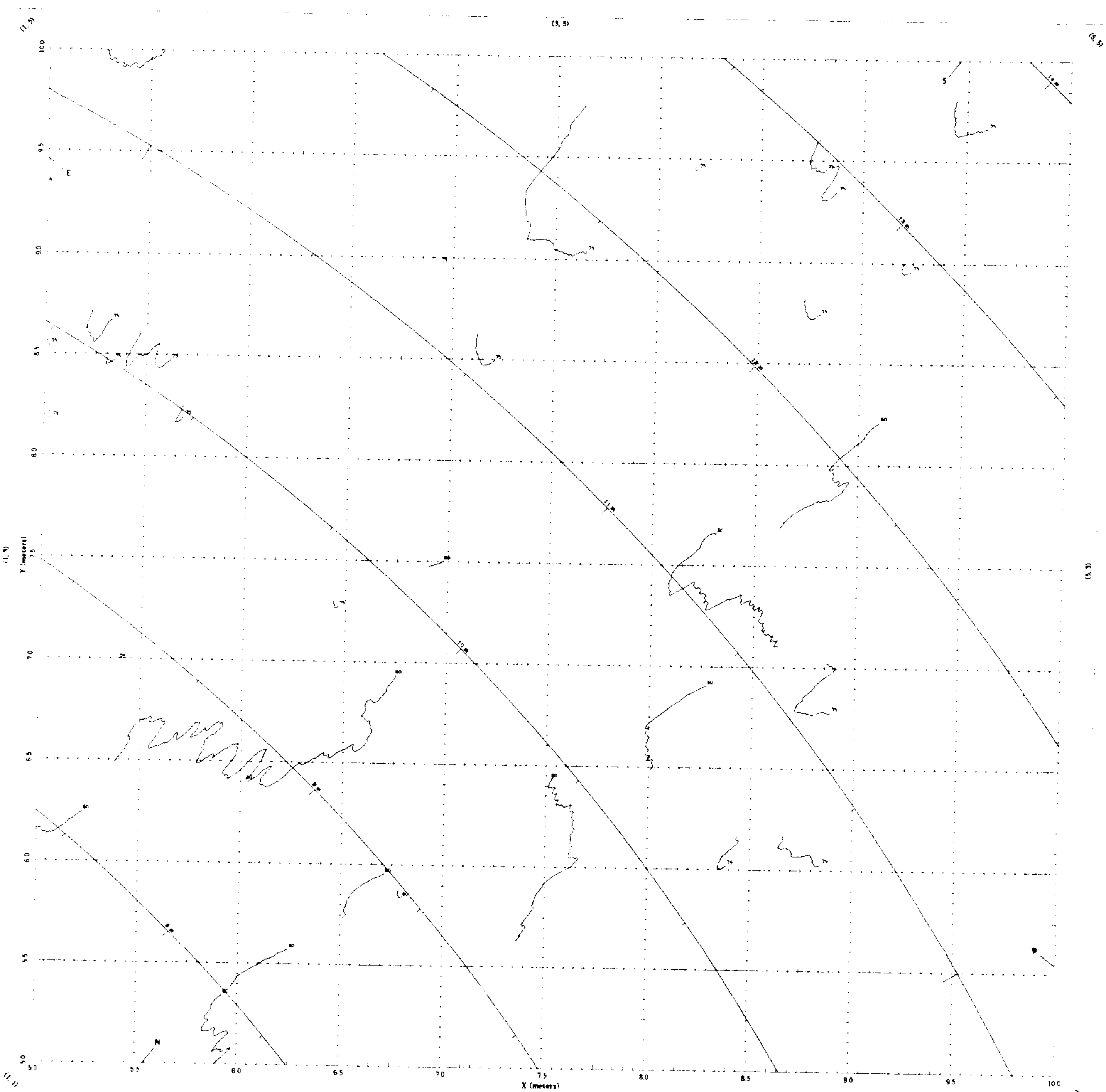
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1 RDSC FRONT VT1026	L1CFP
L1 RDSC EDR FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing facilities of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7518.

G00001229 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (3, 3)

(Elevations (interval variable) in meters.)

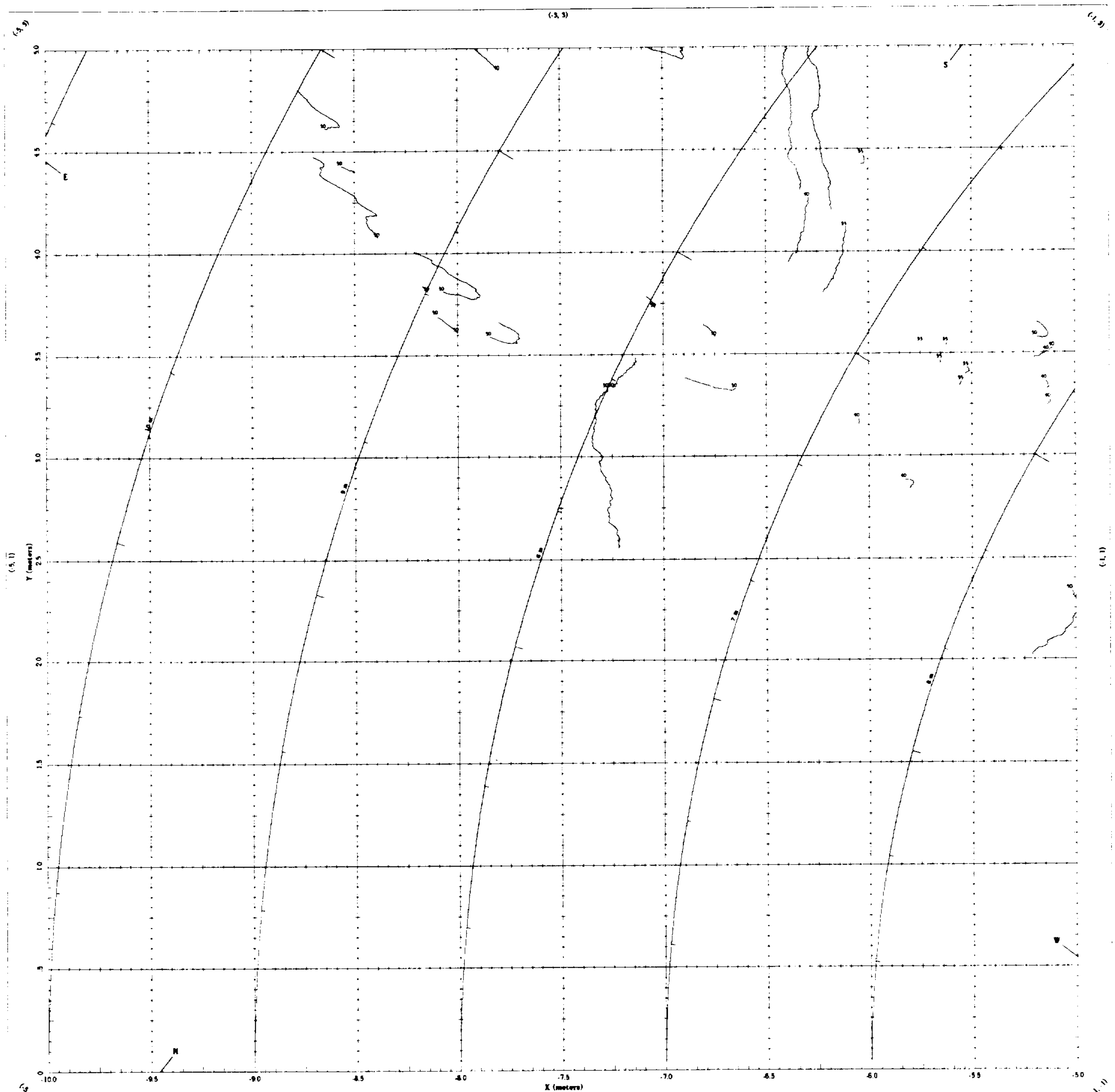
(3, 1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts N.A.S. 1-9682 and JPL 953249 and grant NSG 7538

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.809 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (-3, 1)

(Elevations (interval variable) in meters.)

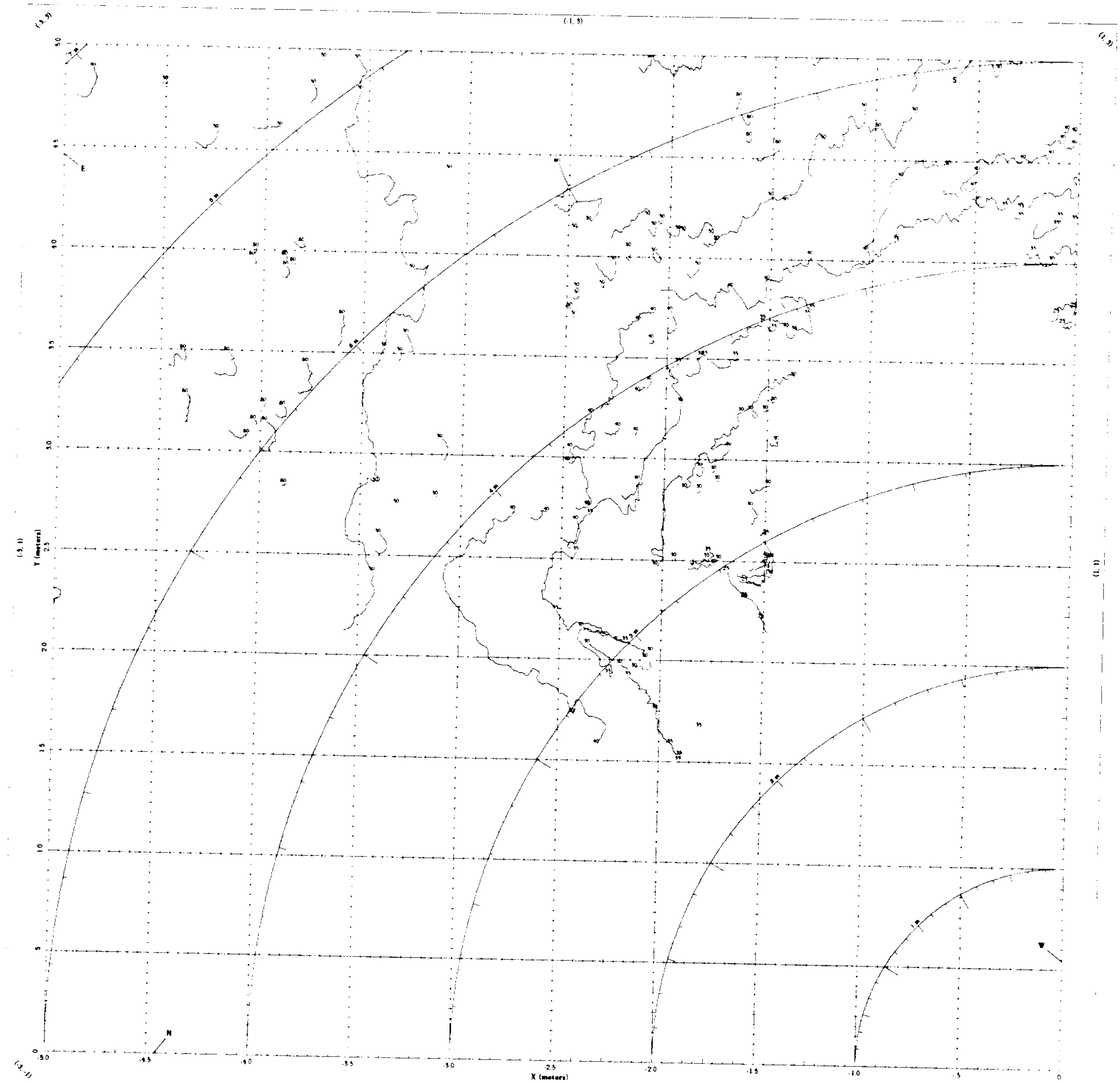
(-3, -1)

Range Data Set Files

JPL	Stanford
L1.ADSC.FRONT.VT1O26	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7234

082080/1279 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

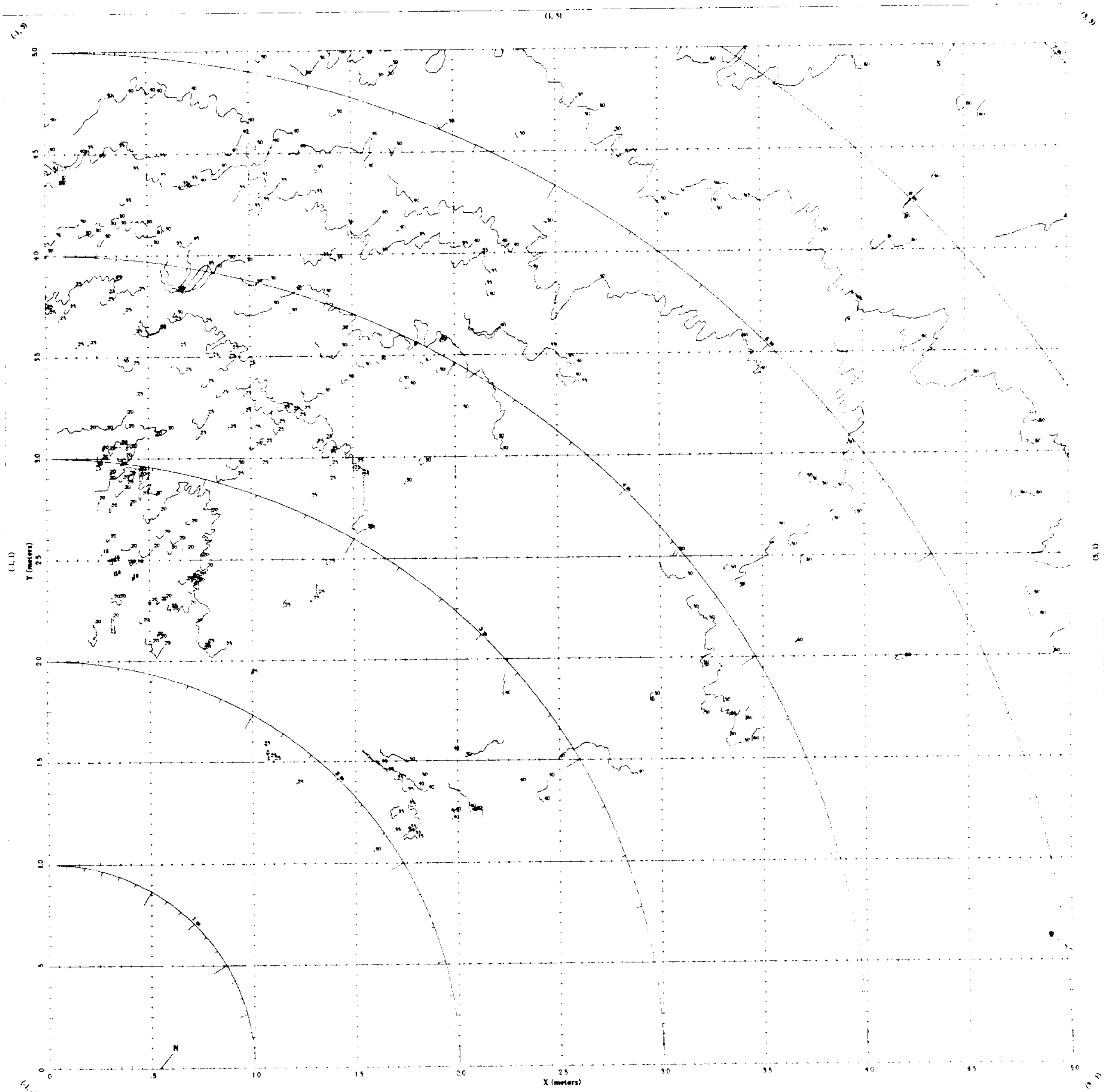
(-1, -1)

Range Data Set Files

JPL	Stanford
L1.ADSC.FRONT.VT1025	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract NAS1-9682 and JPL 955249, and grant NSG 7538.

OCTOBER 1979



VIKING LANDER 1

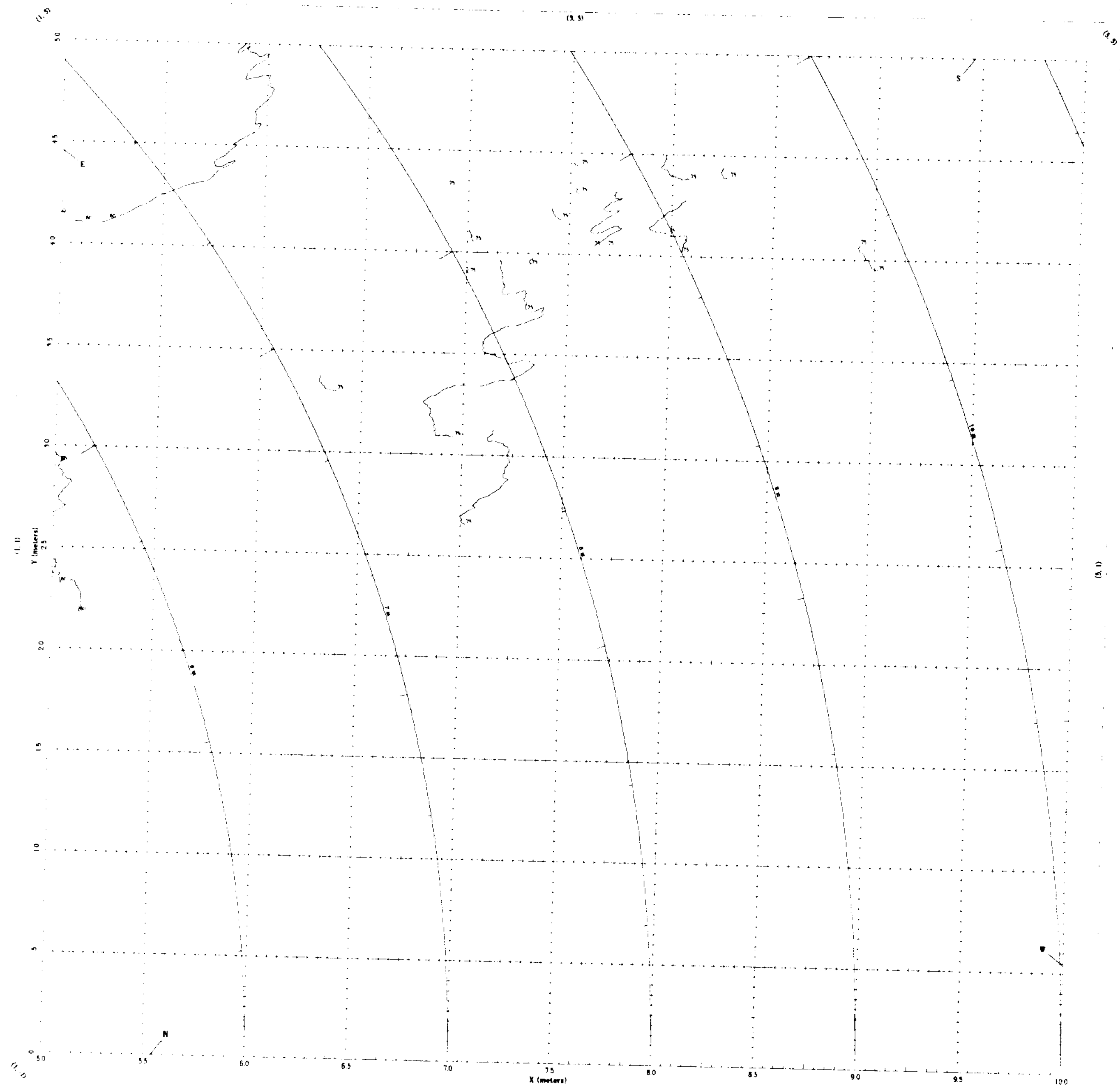
SCALE 1 : 18 SHEET (1, 1)

(Elevations (interval variable) in meters)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1 RDSC FRONT VT1026	L1CFP
L1 RDSC EDR FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR BACK	L1CBA



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (3, 1)

(Elevations (interval variable) in meters)

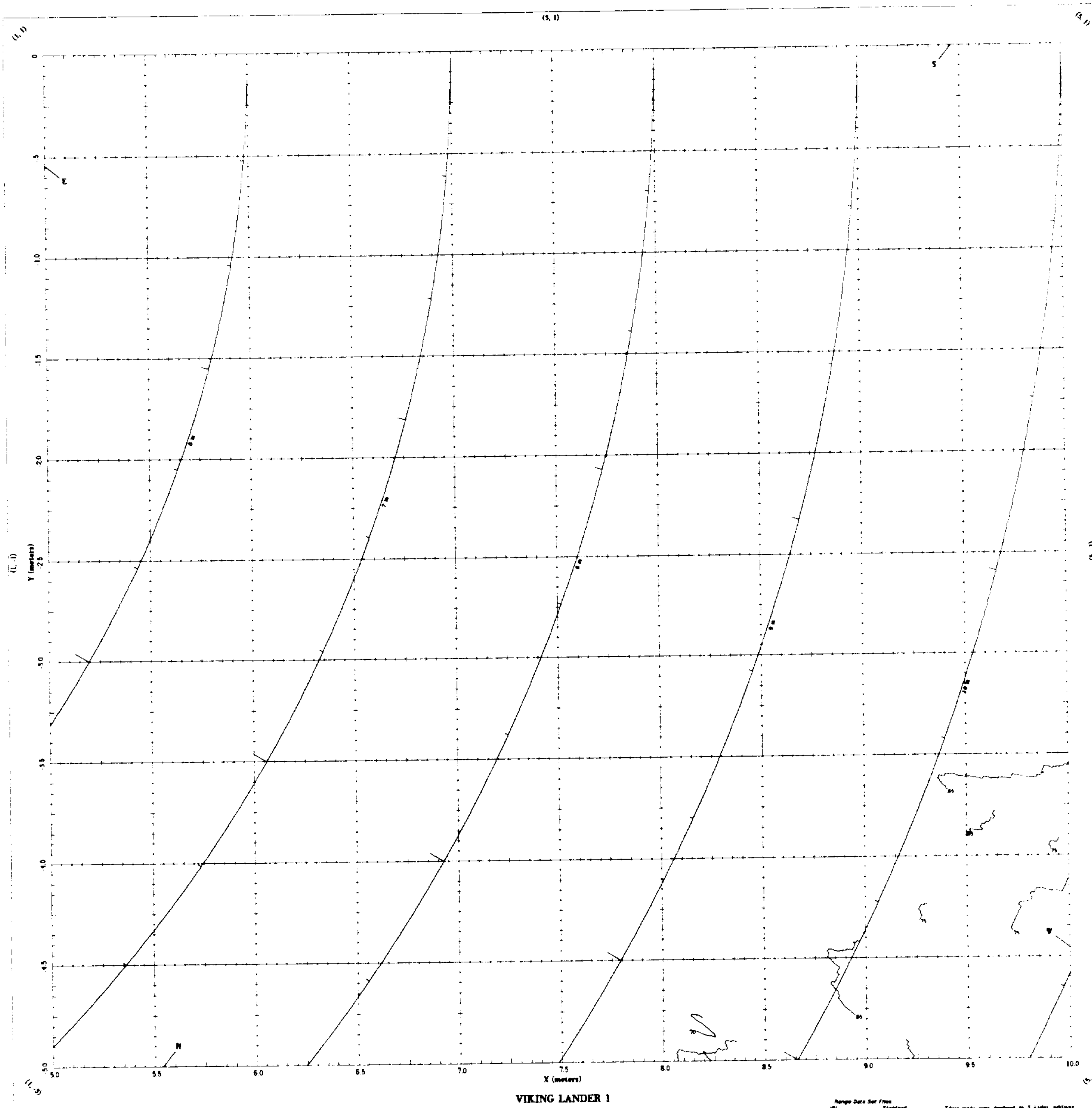
(3, -1)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSG 7118.

0820080229 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 10 SHEET (3, -1)

(Elevations (interval variable) in meters.)

(3, -5)

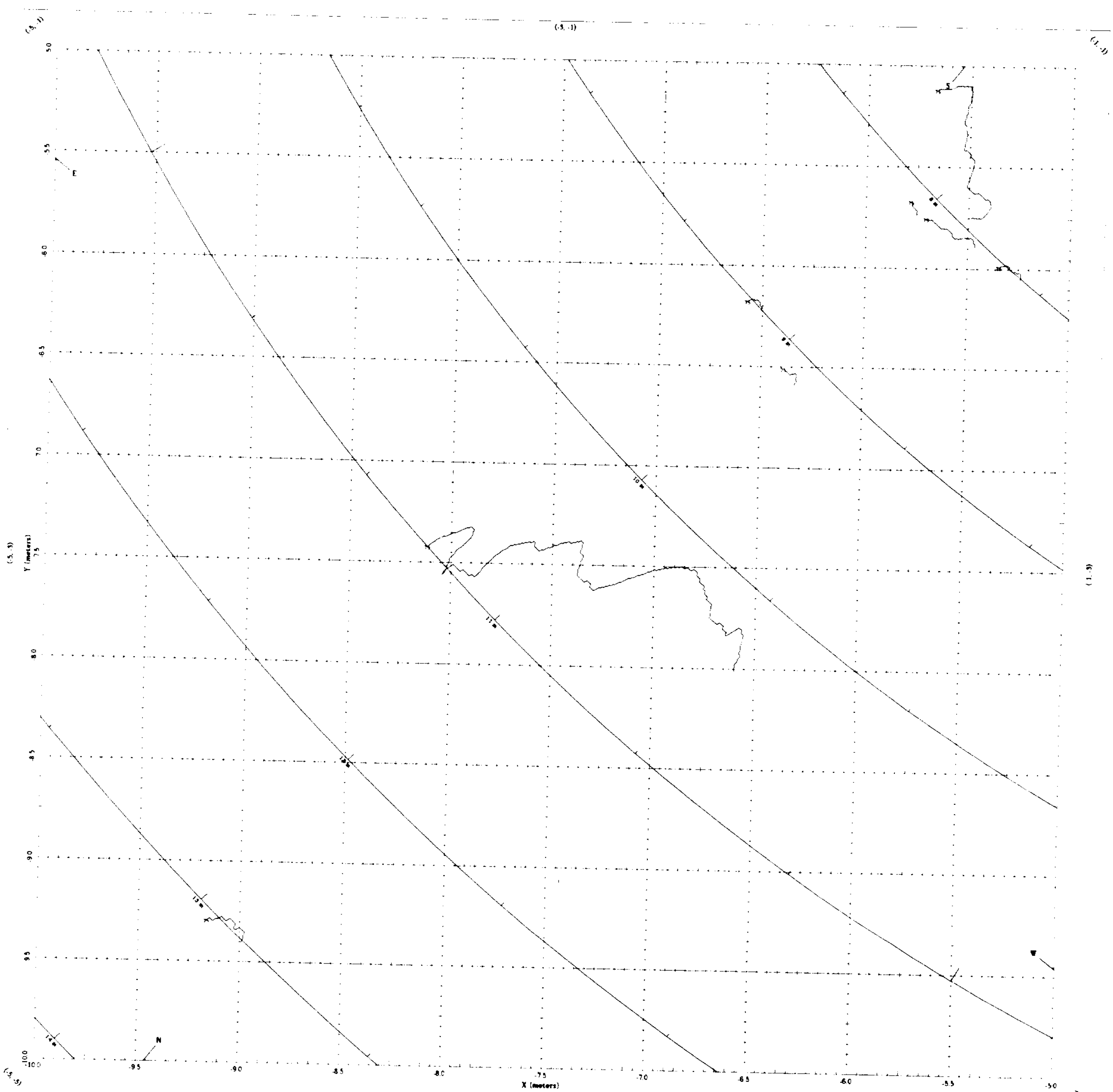
These data are presented in Lander Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1 RDSC FRONT VT1026	L1CFP
L1 RDSC EDR FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract NAS1-9682 and JPL 953249, and grant NSG 7158.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (-3, -3)

(Elevations (interval variable) in meters.)

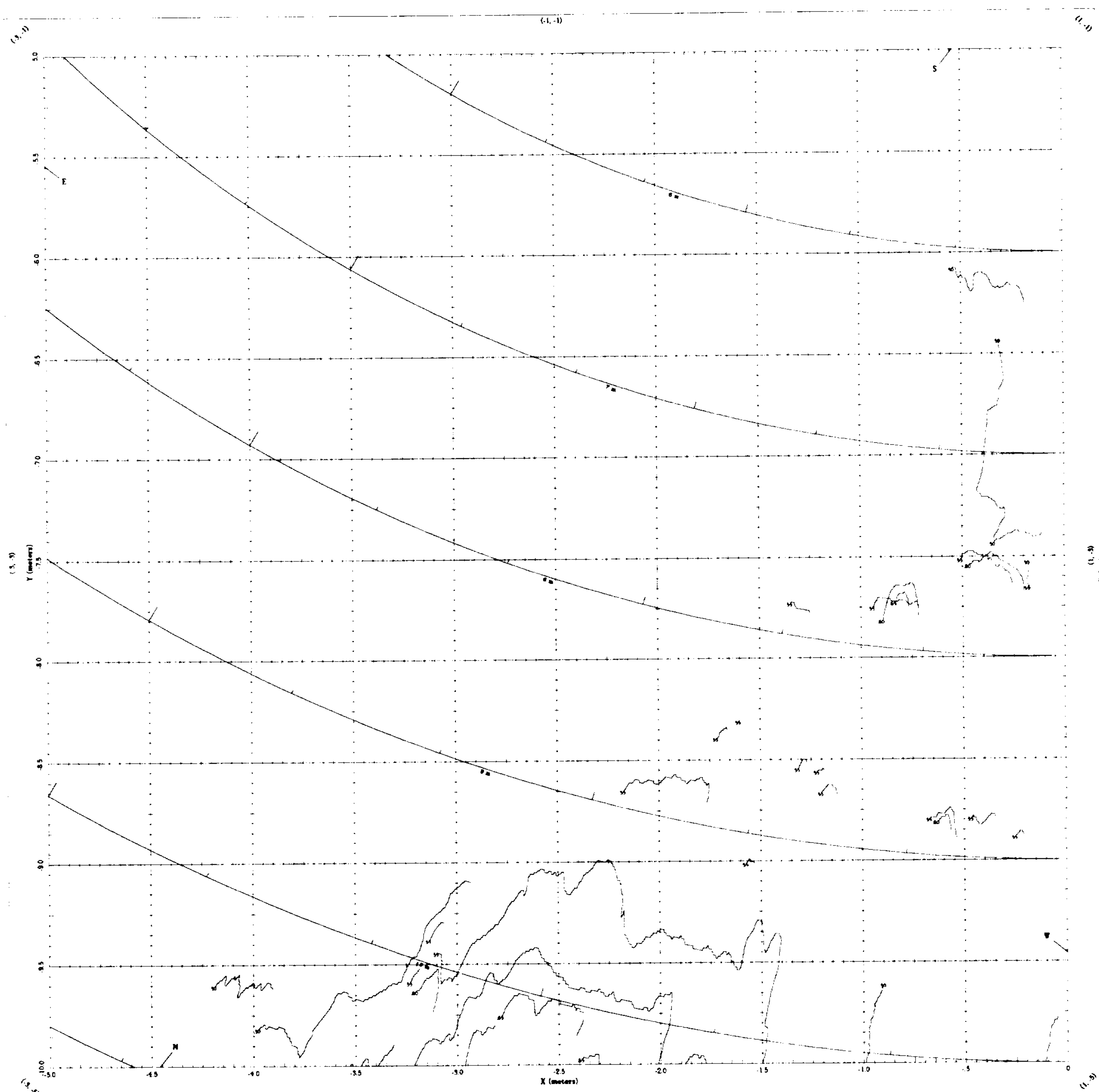
(-3, -5)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT VT1025	L1CFP
L1.RDSC.EDR FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSG 7148.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 10 SHEET (-1, -3)

(Elevations (interval variable) in meters.)

(-1, -5)

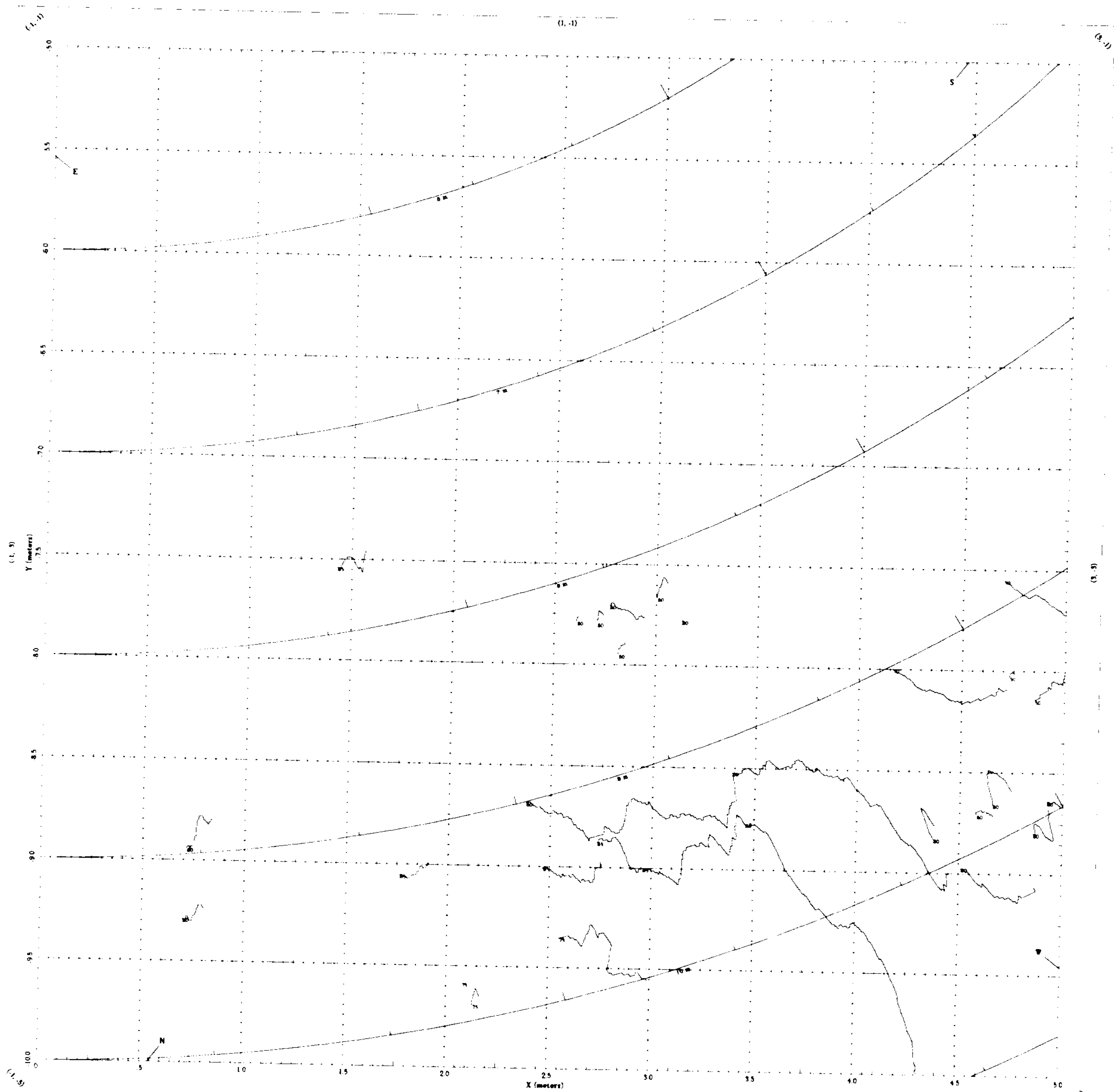
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by J. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts # AS1-9682 and JPL 955249, and grant # SC 7598

[illegible]1229 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 10 SHEET (1, -3)

(Elevations (interval variable) in meters.)

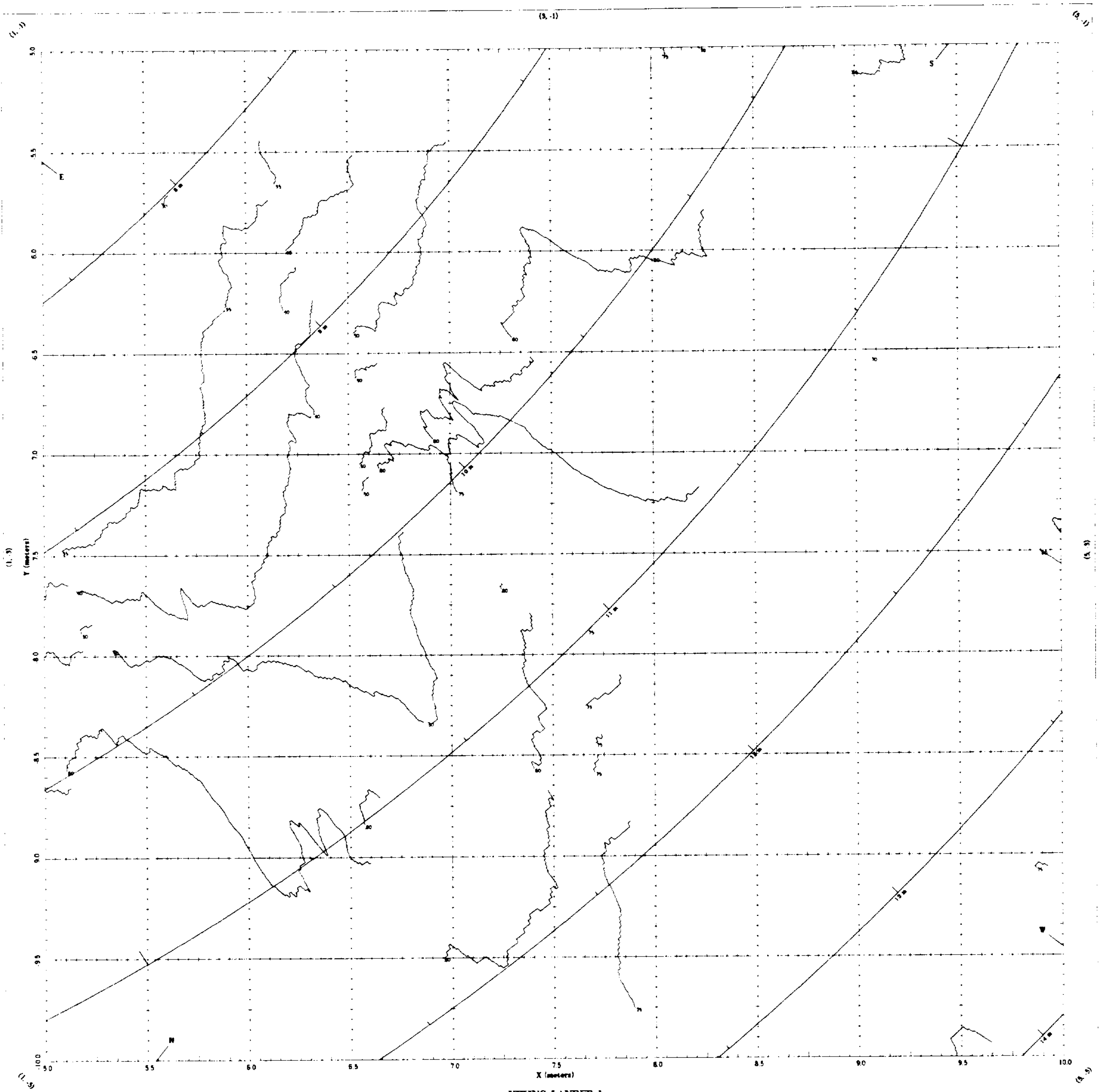
(1, -5)

Range Data Set Files

JPL:	Stanford:
L1 RDSC FRONT VT1025	L1CFP
L1 RDSC EDR FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7338.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 10 SHEET (3, -3)

(Elevations (interval variable) in meters.)

(3, -5)

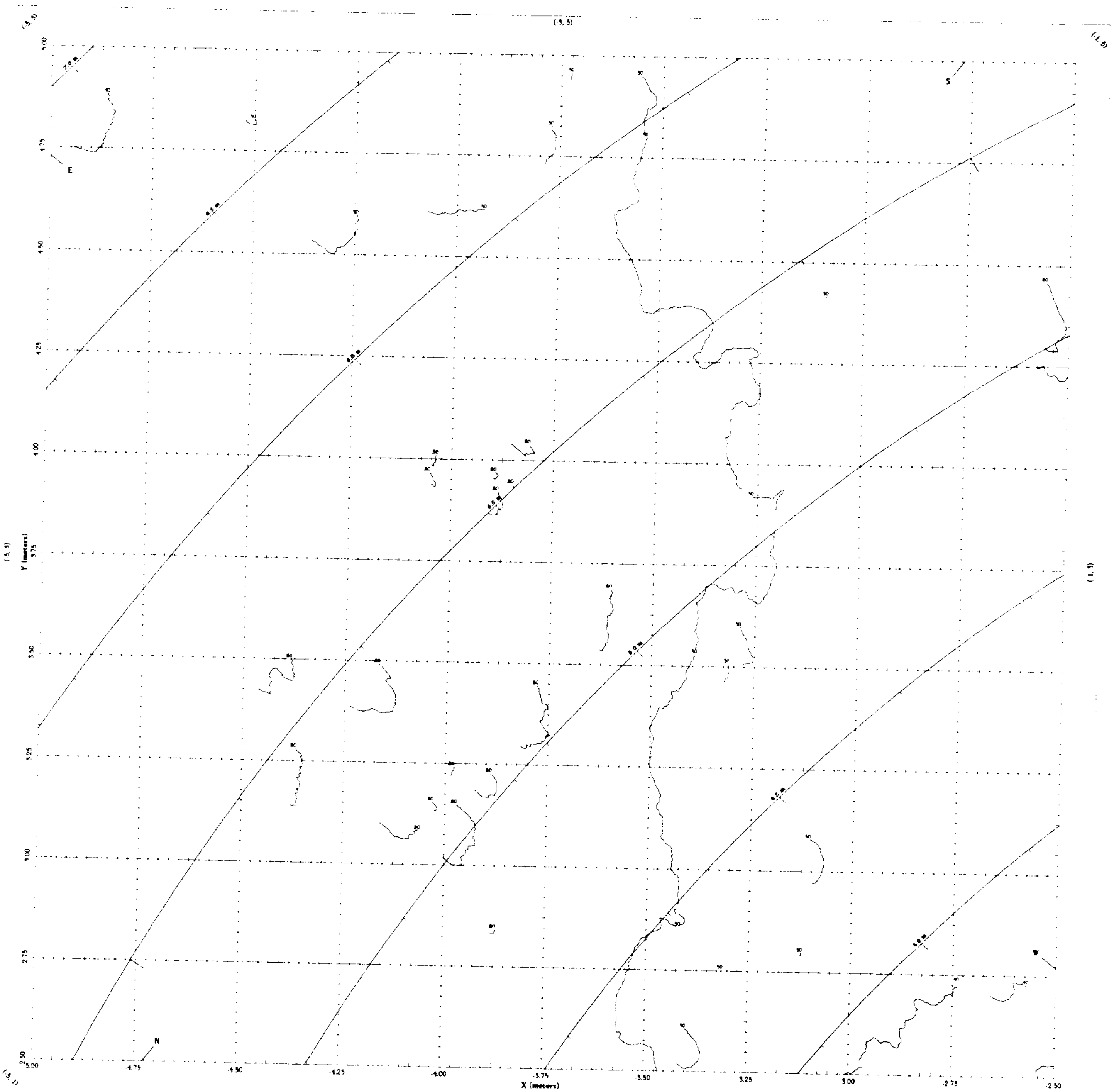
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFR
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 955349, and grant NSG 7538

[illegible] OCTOBER 1979



X (meters)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 5 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

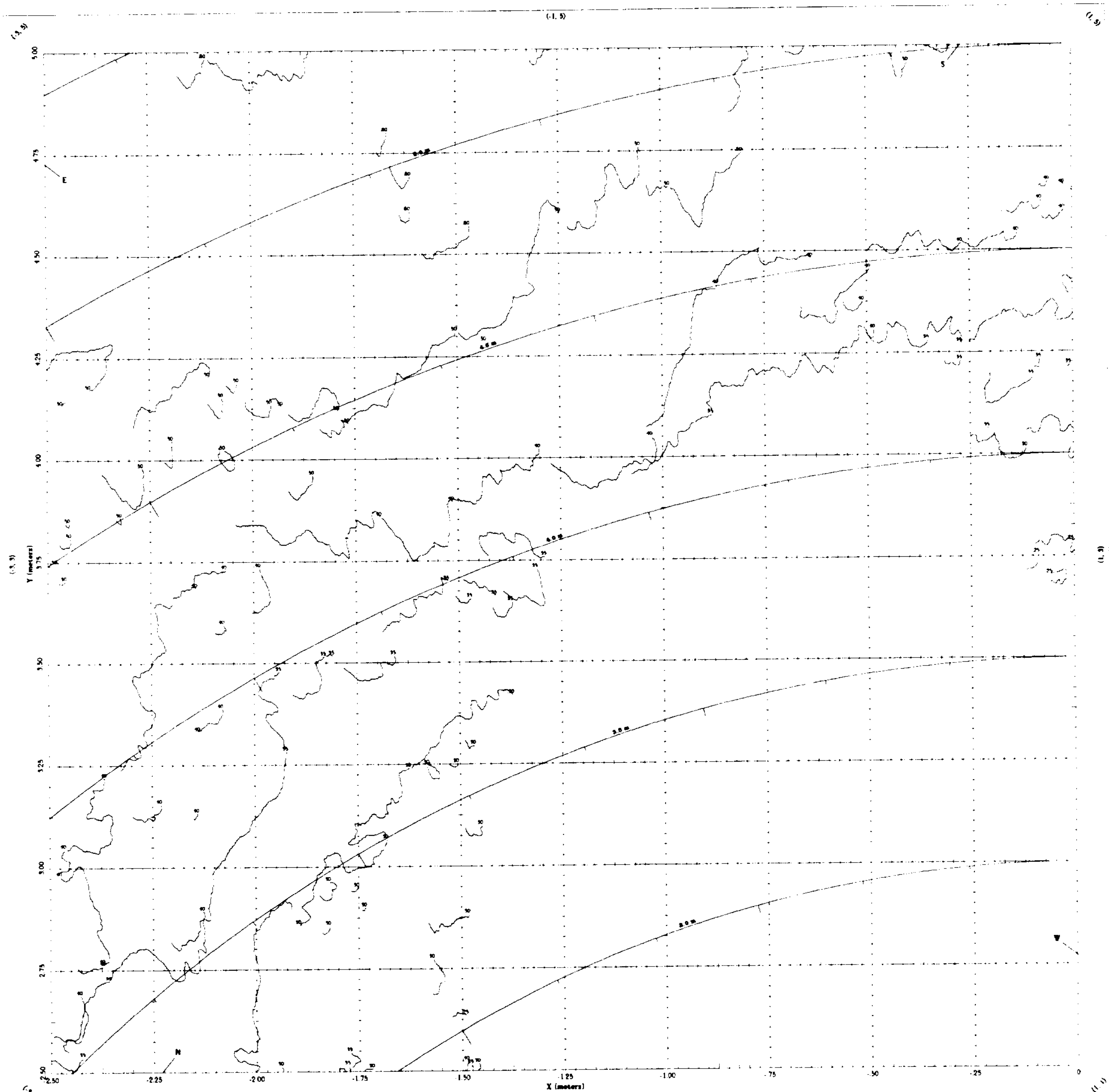
(-3, 1)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953249, and grant NSG 7318.

082080/1279 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 5 SHEET (-1, 3)

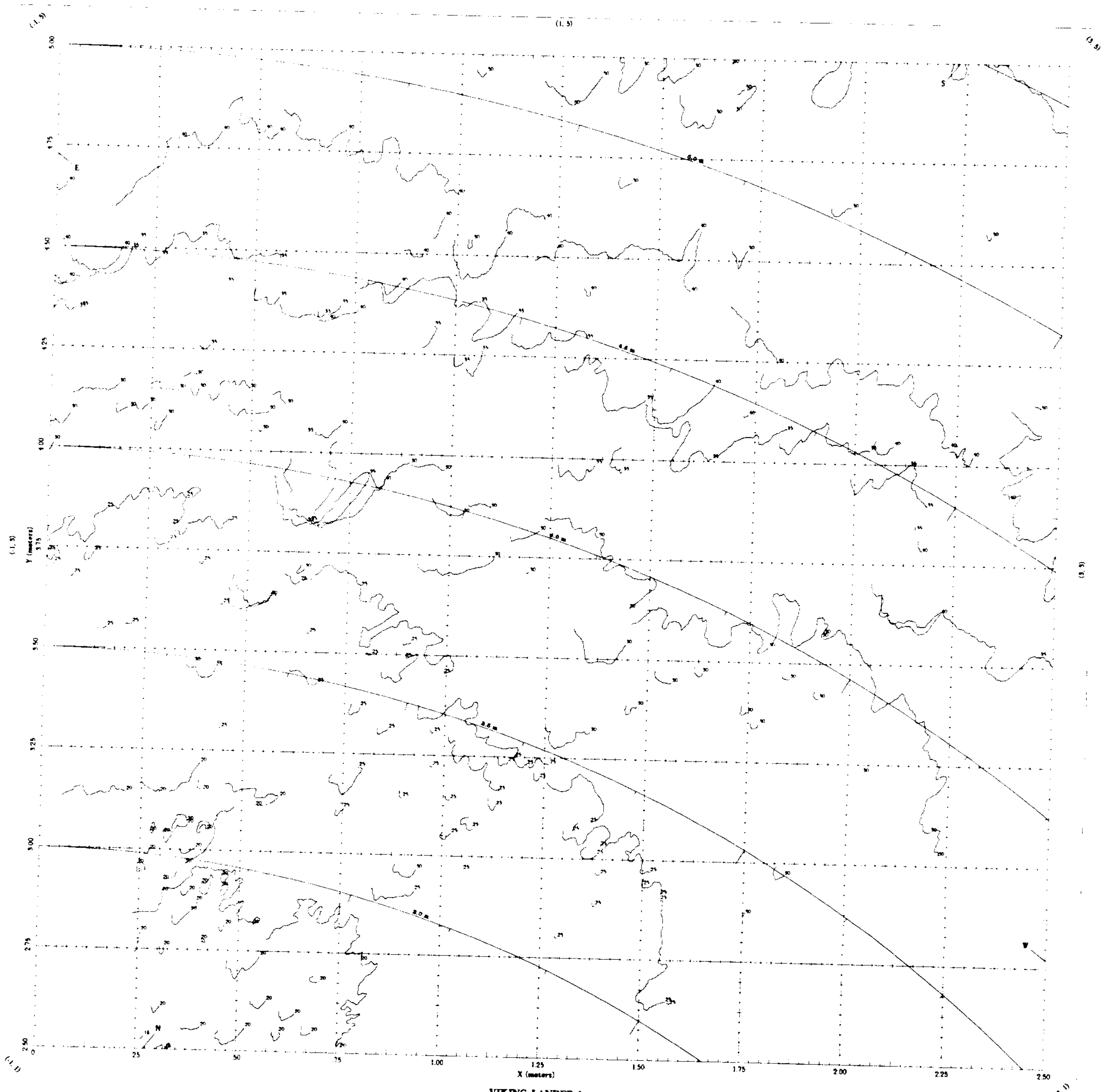
(Elevations (interval variable) in meters.)

(-1, 1)

Range Data Set Files	
JPL	Stanford
L1.ADSC.FRONT.VT1026	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9683 and JPL 953149, and grant NSG 7338

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-Y-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 5 SHEET (1, 3)

(Elevations (interval variable) in meters.)

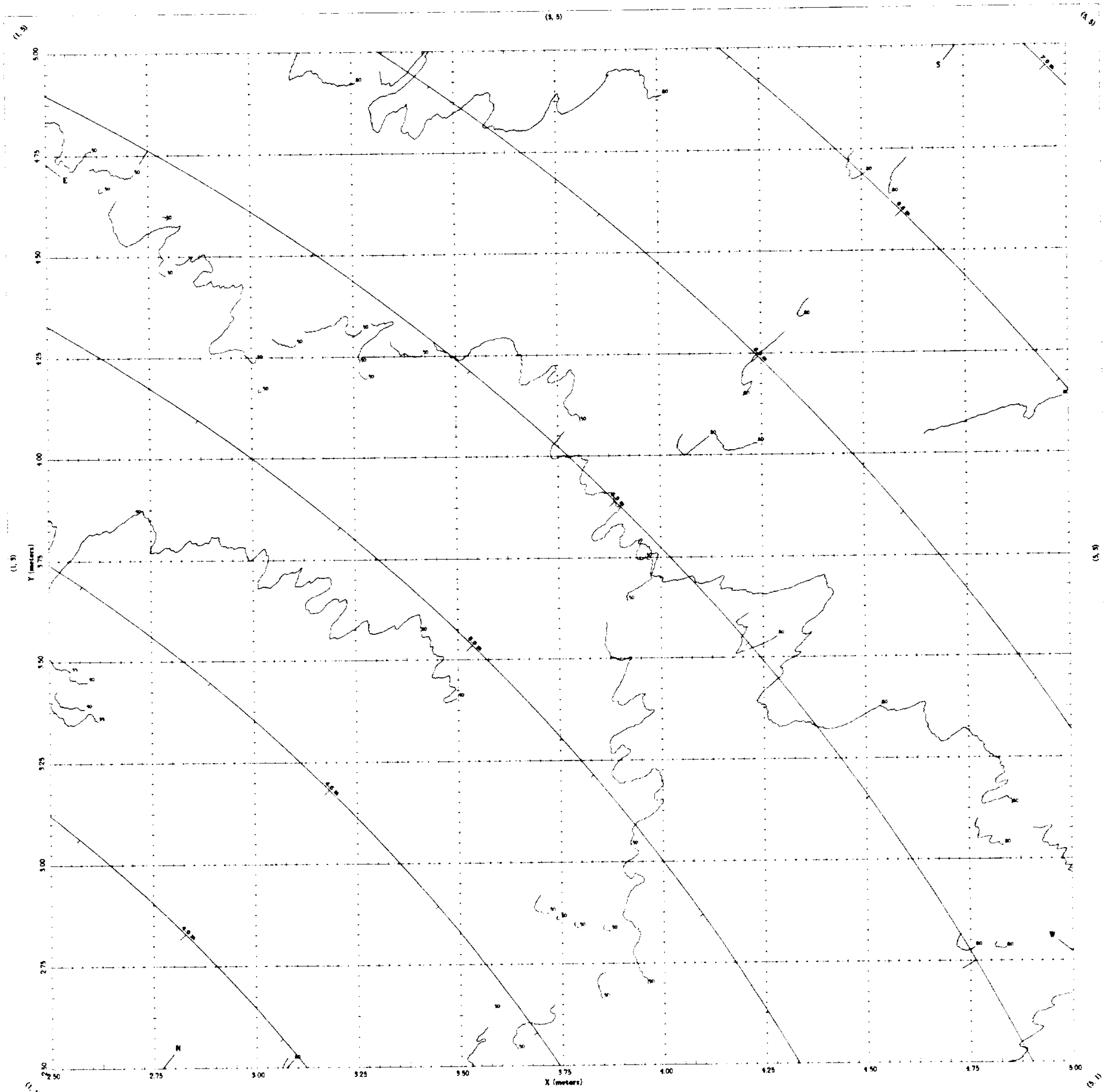
(1, 1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSF 7134

082080/1229 OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 5 SHEET (3, 3)

(Elevations (interval variable) in meters.)

(3, 1)

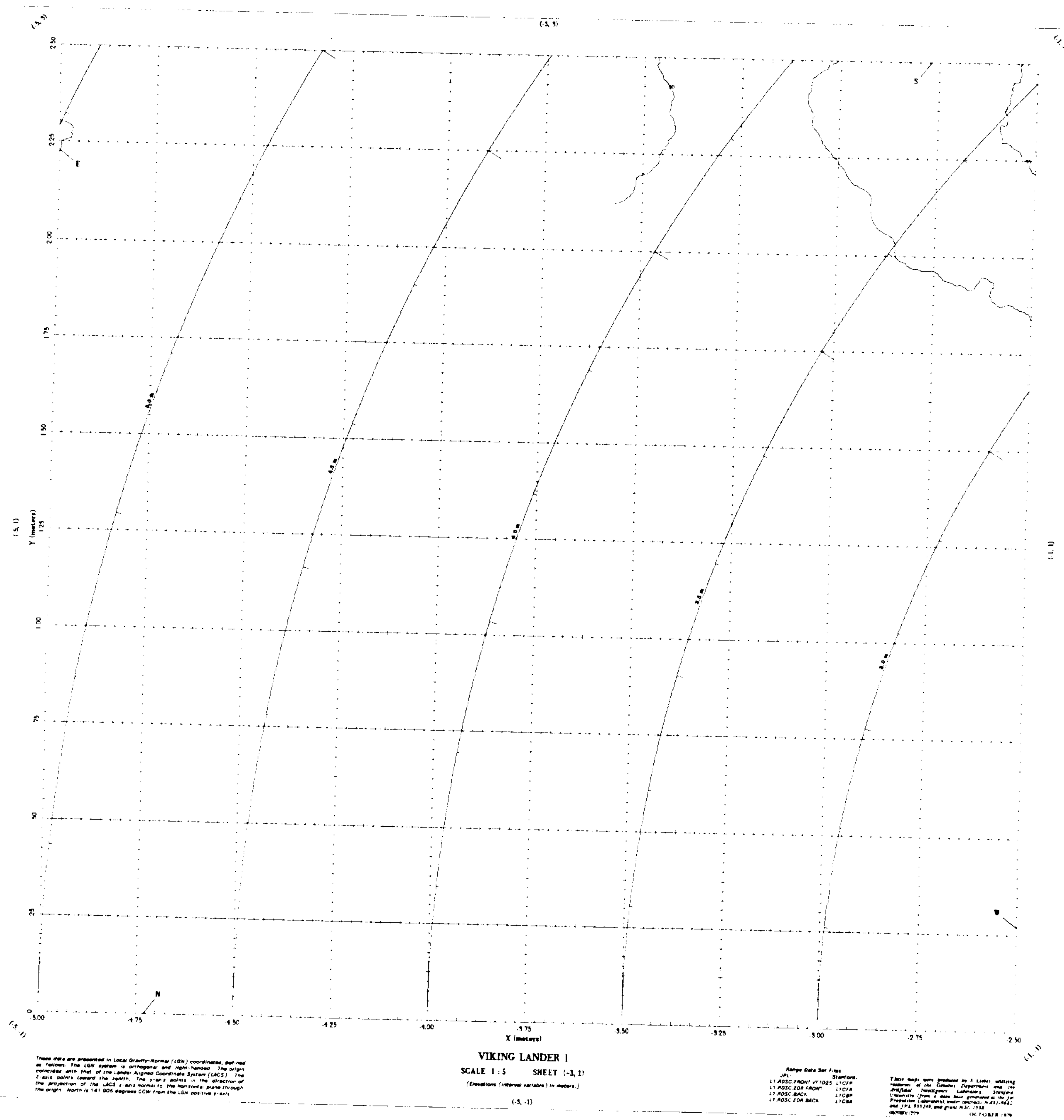
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.

Range Data Set Files

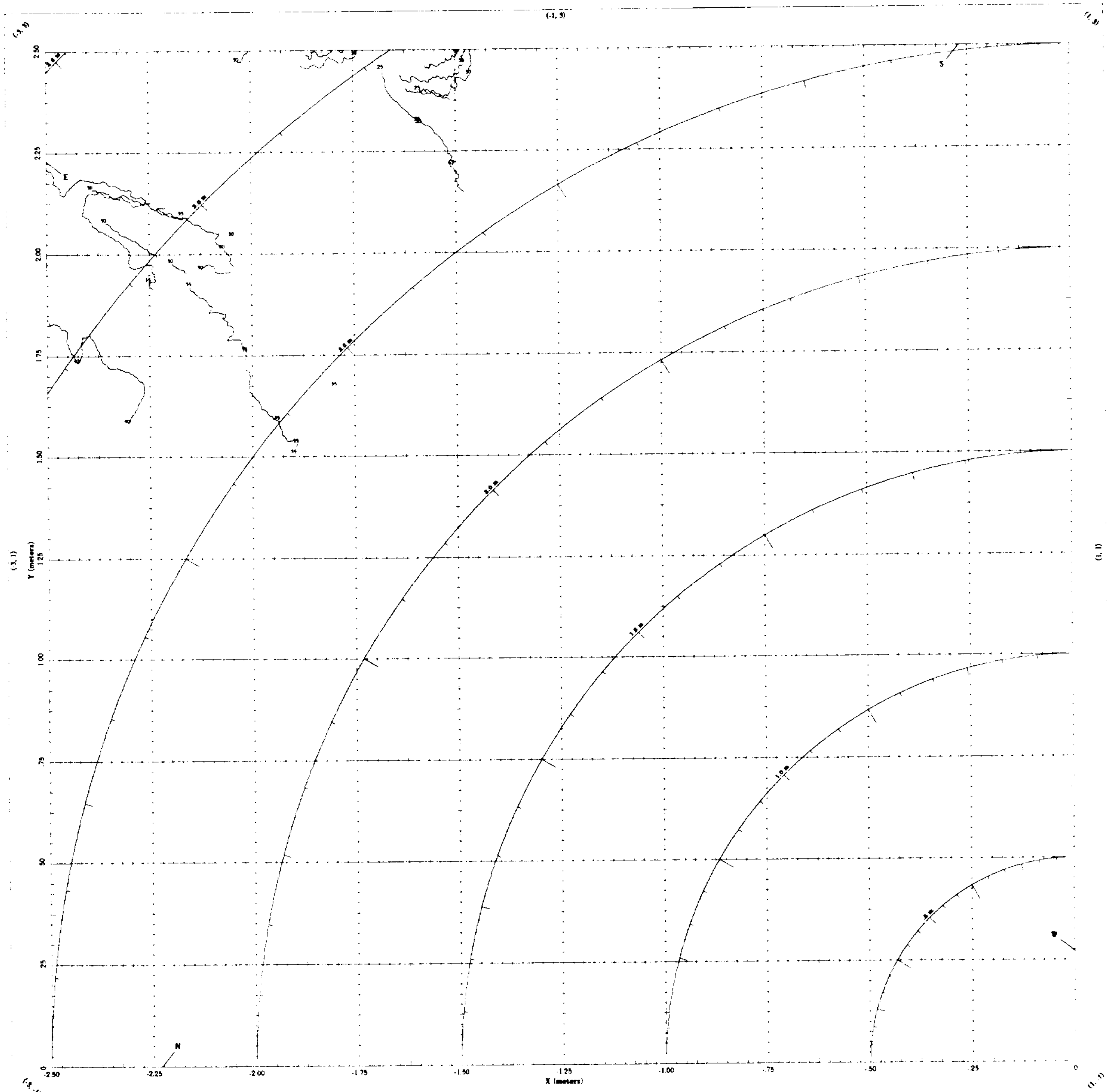
JPL	Stanford
L1 RDSC FRONT VT1026	L1CFP
L1 RDSC EDR FRONT	L1CFA
L1 RDSC BACK	L1CBP
L1 RDSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7238.

OCTOBER 1979



(-3, 3)
(-1, 3)
(-5, 1)
(-1, 1)
(-5, -1)
(-1, -1)
(-3, -1)
Y (meters)
X (meters)
2.50
2.25
2.00
1.75
1.50
1.25
1.00
.75
.50
.25
0
-5.00
-4.75
-4.50
-4.25
-4.00
-3.75
-3.50
-3.25
-3.00
-2.75
-2.50
E
S
N
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.
VIKING LANDER 1
SCALE 1 : 5
SHEET (-3, 1)
(Elevations (interval variable) in meters.)
Range Data Set Files
JPL
Stanford
L1.RDSC.FRONT.VT1025
L1CFP
L1.RDSC.EDR.FRONT
L1CFA
L1.RDSC.BACK
L1CBP
L1.RDSC.EDR.BACK
L1CBA



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.808 degrees CCW from the LGN positive y-axis

VIKING LANDER 1

SCALE 1 : 5 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

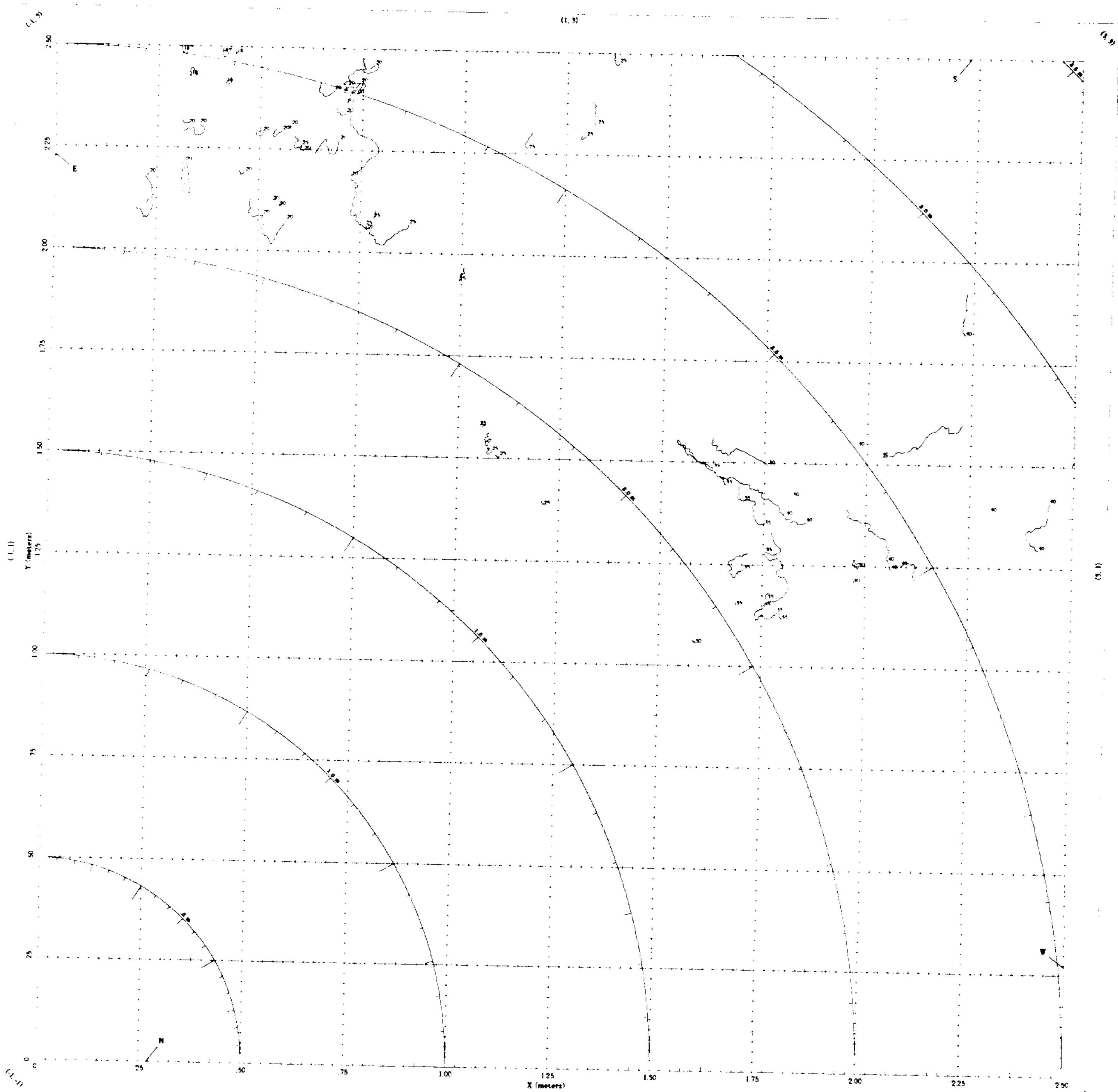
(-1, -1)

Range Data Set Files

JPL:	Stanford:
L1 ADSC.FRONT.VT1025	L1CFP
L1 ADSC.EDR.FRONT	L1CFA
L1 ADSC.BACK	L1CBP
L1 ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249, and grant [illegible]

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 5 SHEET (1, 1)

(Elevations (interval variable) in meters.)

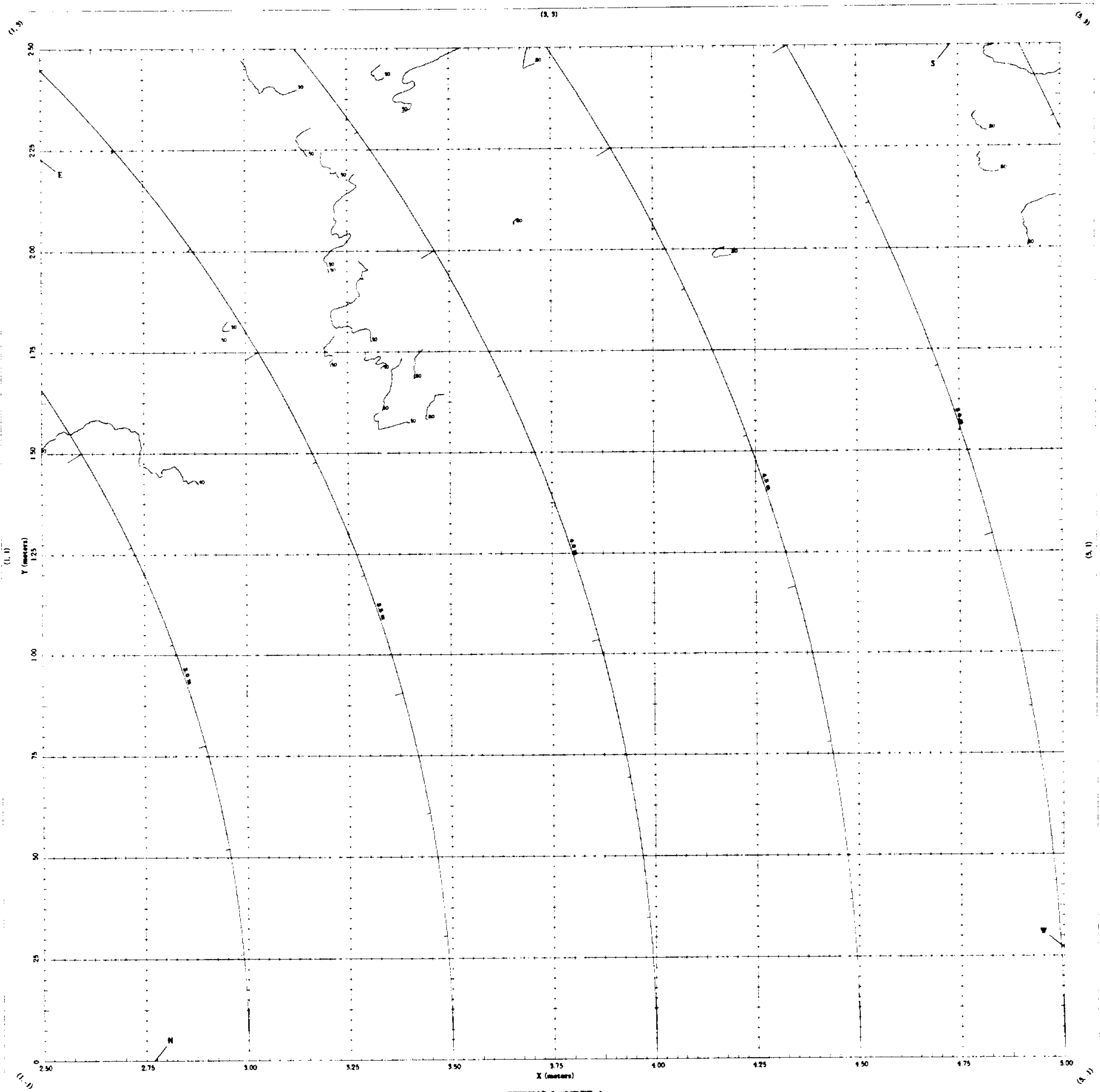
(1, -1)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1025	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9683 and JPL 955249, and from NSG 7538.

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 5 SHEET (3, 1)

(Elevations (interval variable) in meters.)

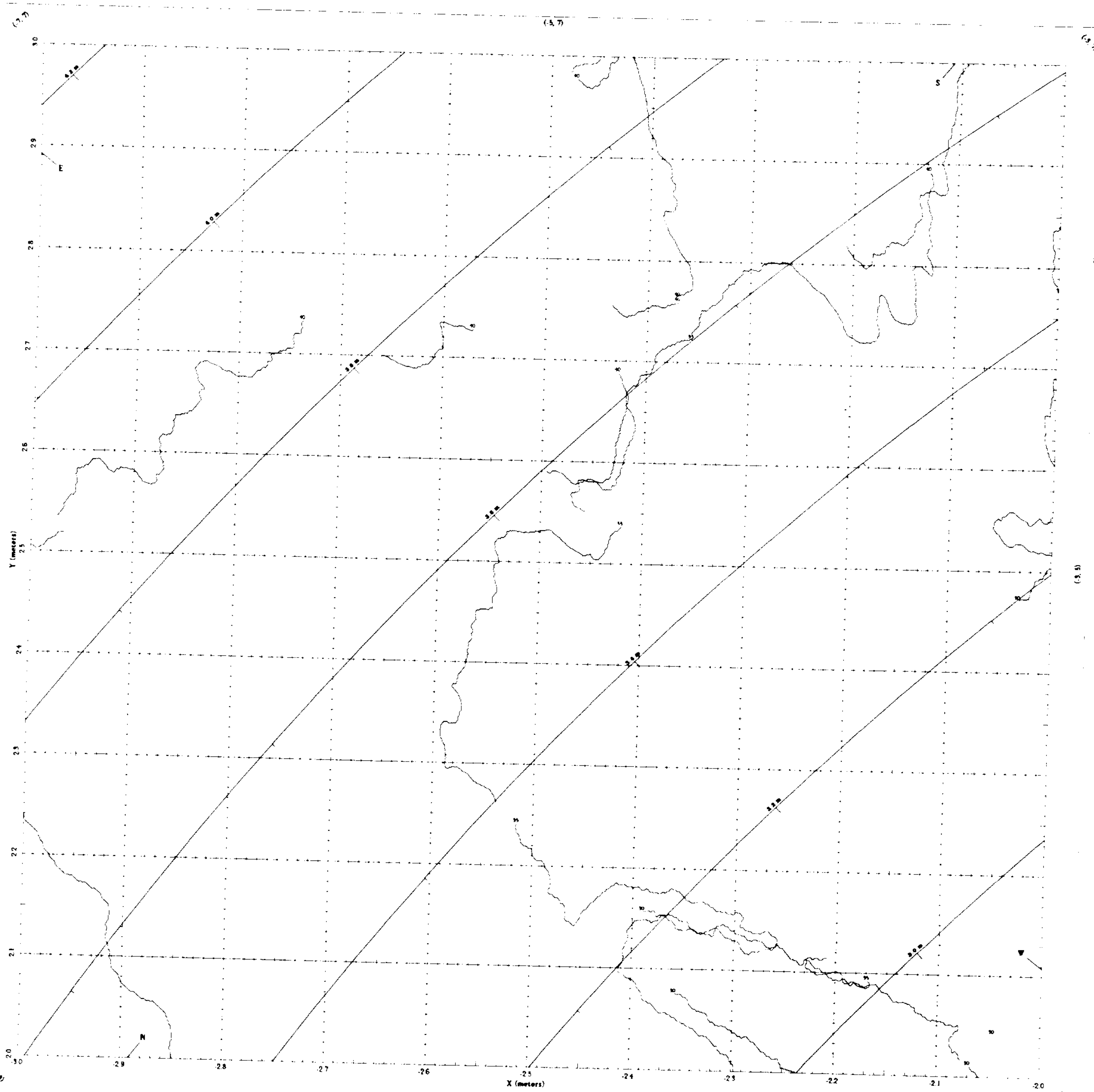
(5, -1)

Range Data Set Pairs

JPL:	Stanford:
L1.RDSC.FRONT.V71026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts JPL 951-9682 and JPL 955249, and grant NSG 7538.

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.906 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 2 SHEET (-5, 5)

(Elevations (interval variable) in meters)

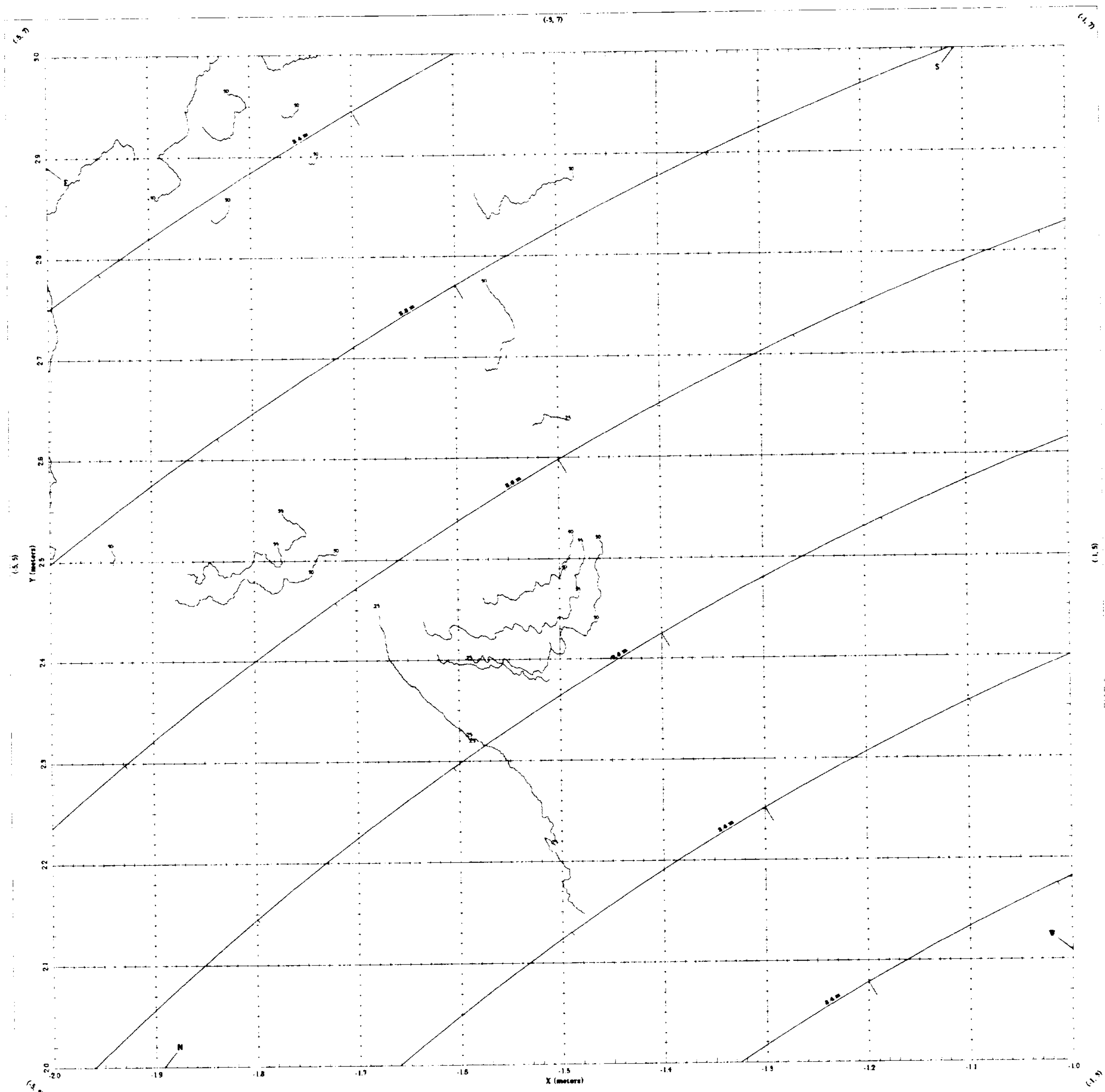
(-5, 5)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT V71026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSF 7348 [illegible]

0810080/2255 OCTOBER 1978



VIKING LANDER 1

SCALE 1 : 1 SHEET (-3, 5)

(Elevations (interval variable) in meters.)

(-3, 5)

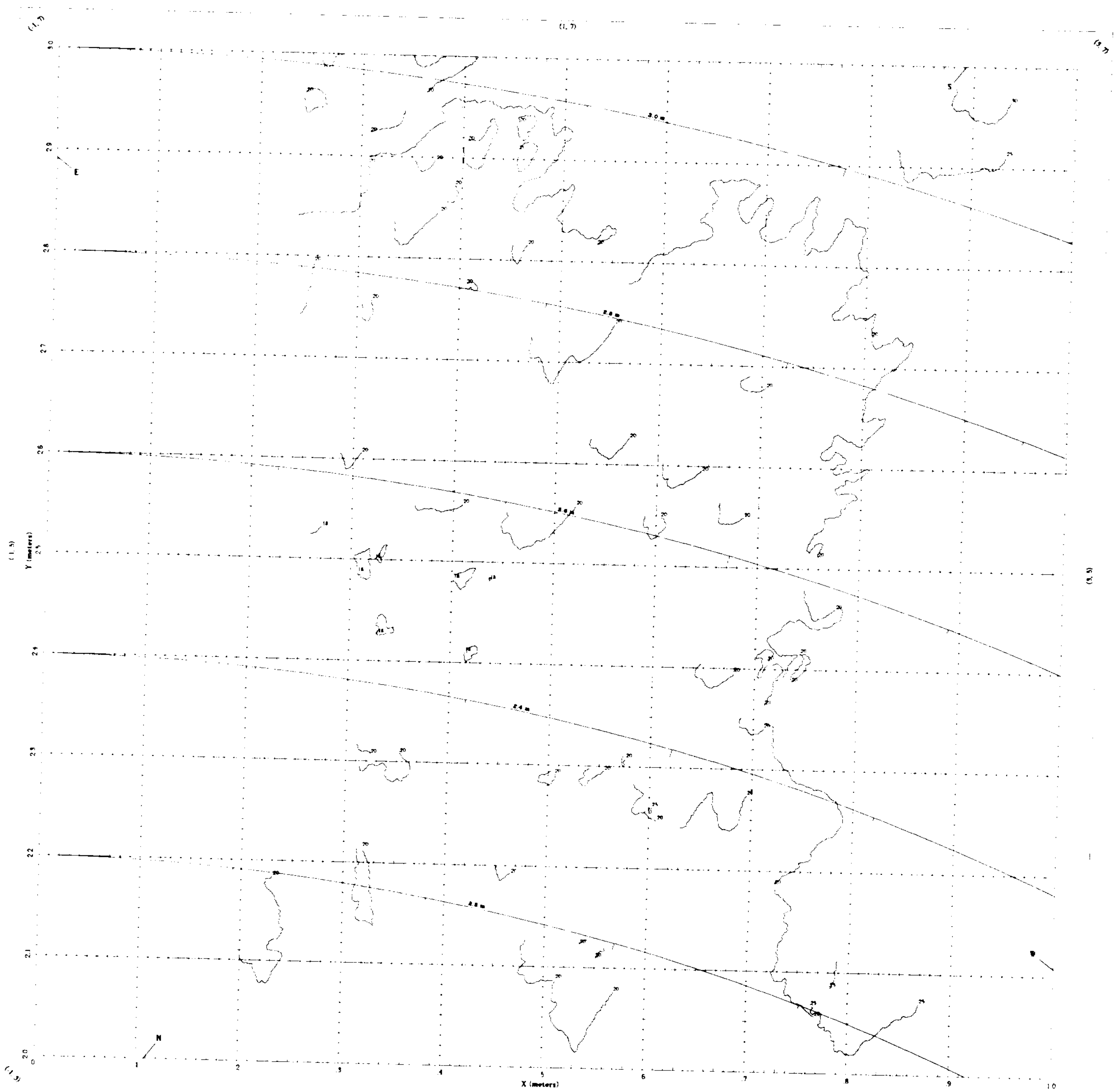
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.ADSC.FRONT.VT1026	L1CFP
L1.ADSC.EDR.FRONT	L1CFA
L1.ADSC.BACK	L1CBP
L1.ADSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953299 and grant NSC 7138

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The x-axis points in the direction of the projection of the LACS-z axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 2 SHEET (1, 5)

(Elevations (interval variable) in meters.)

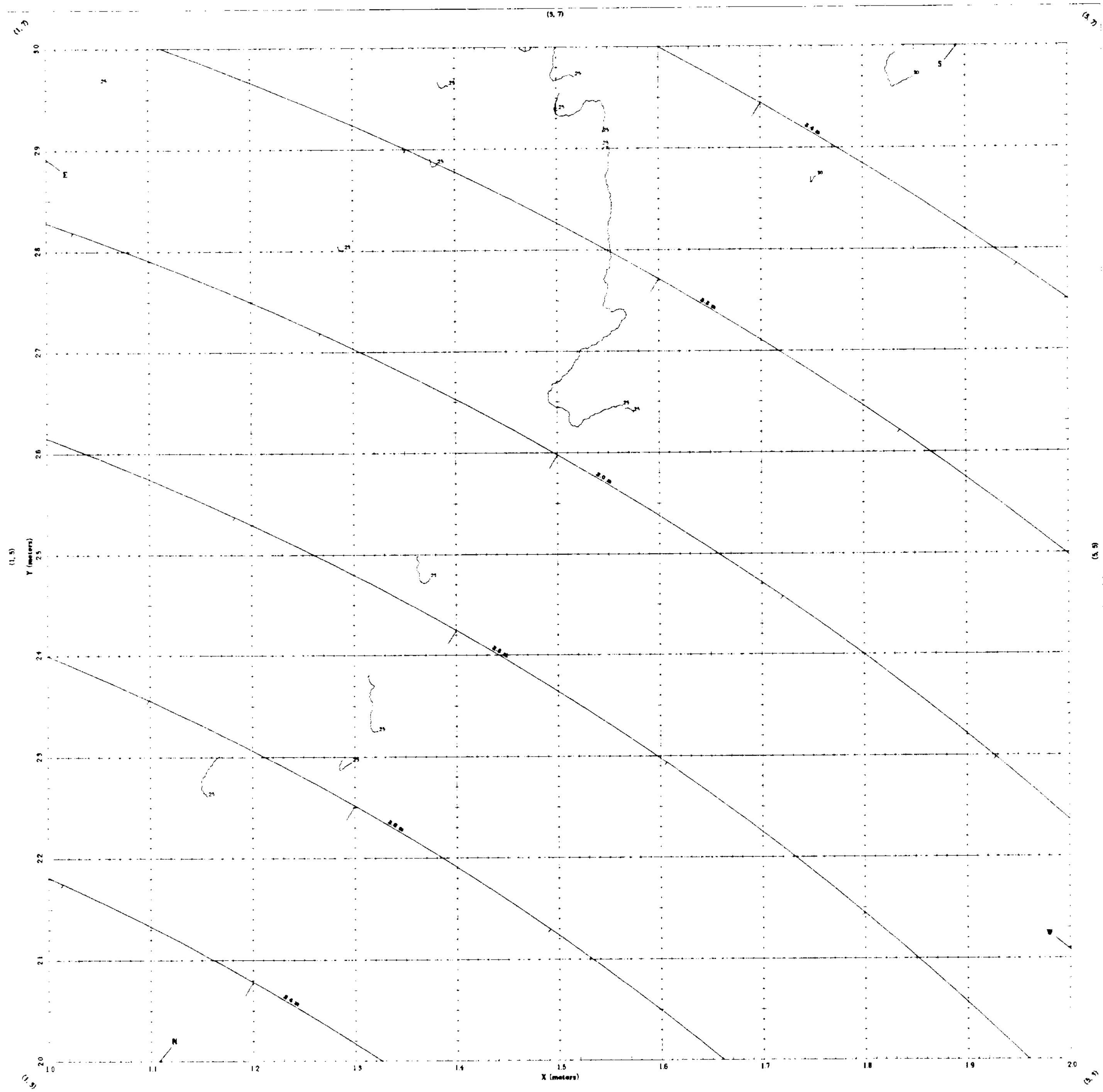
(1, 5)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9683 and JPL 953269 and grant NSG 7538.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 2   SHEET (3, 5)

(Elevations (interval variable) in meters.)

(3, 5)

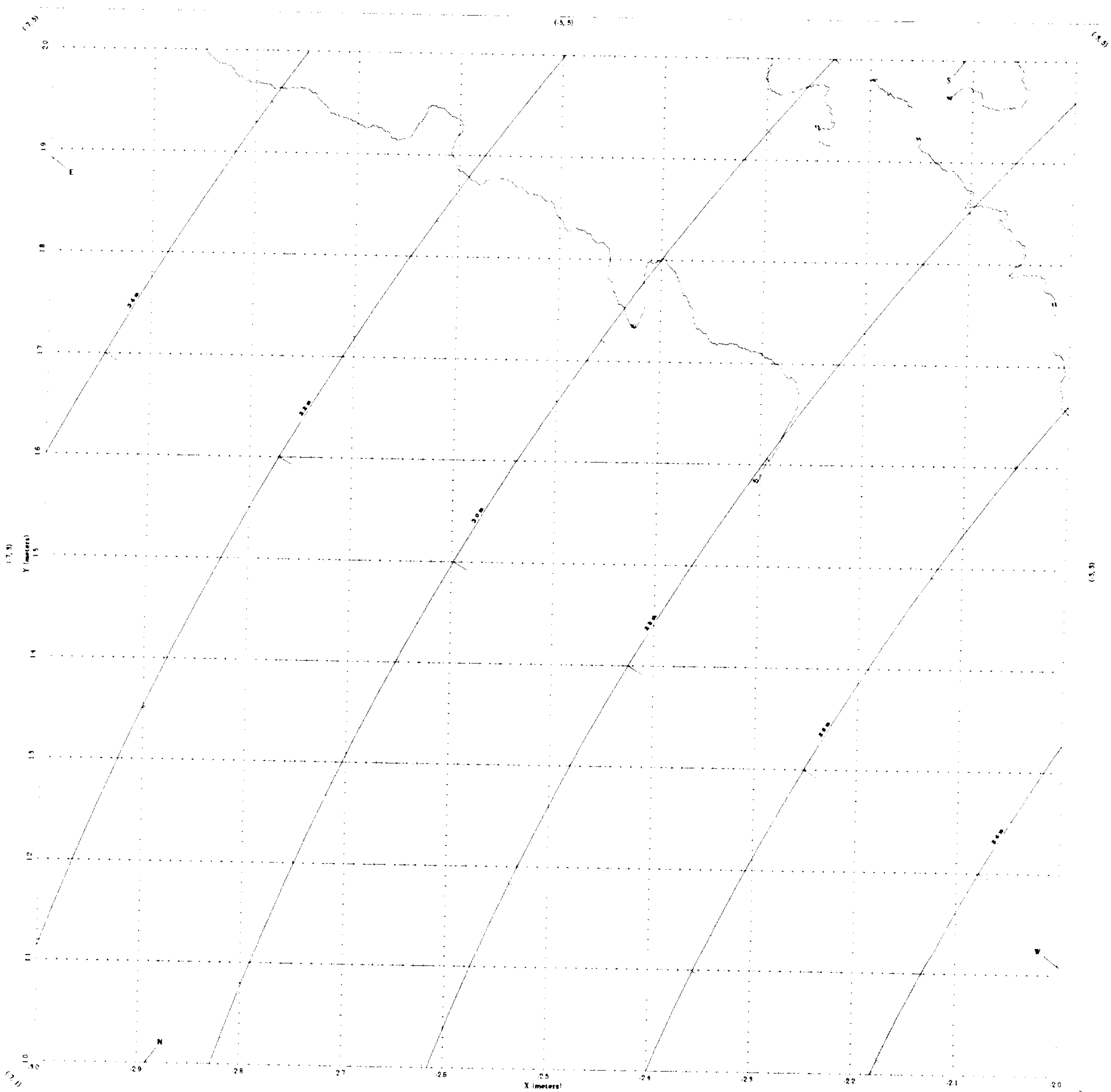
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.805 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9683 and JPL 955249, and grant NSG-7556.

[illegible]   OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y axis.

VIKING LANDER 1

SCALE 1 : 2 SHEET (-5, 3)

(Elevations (interval variable) in meters.)

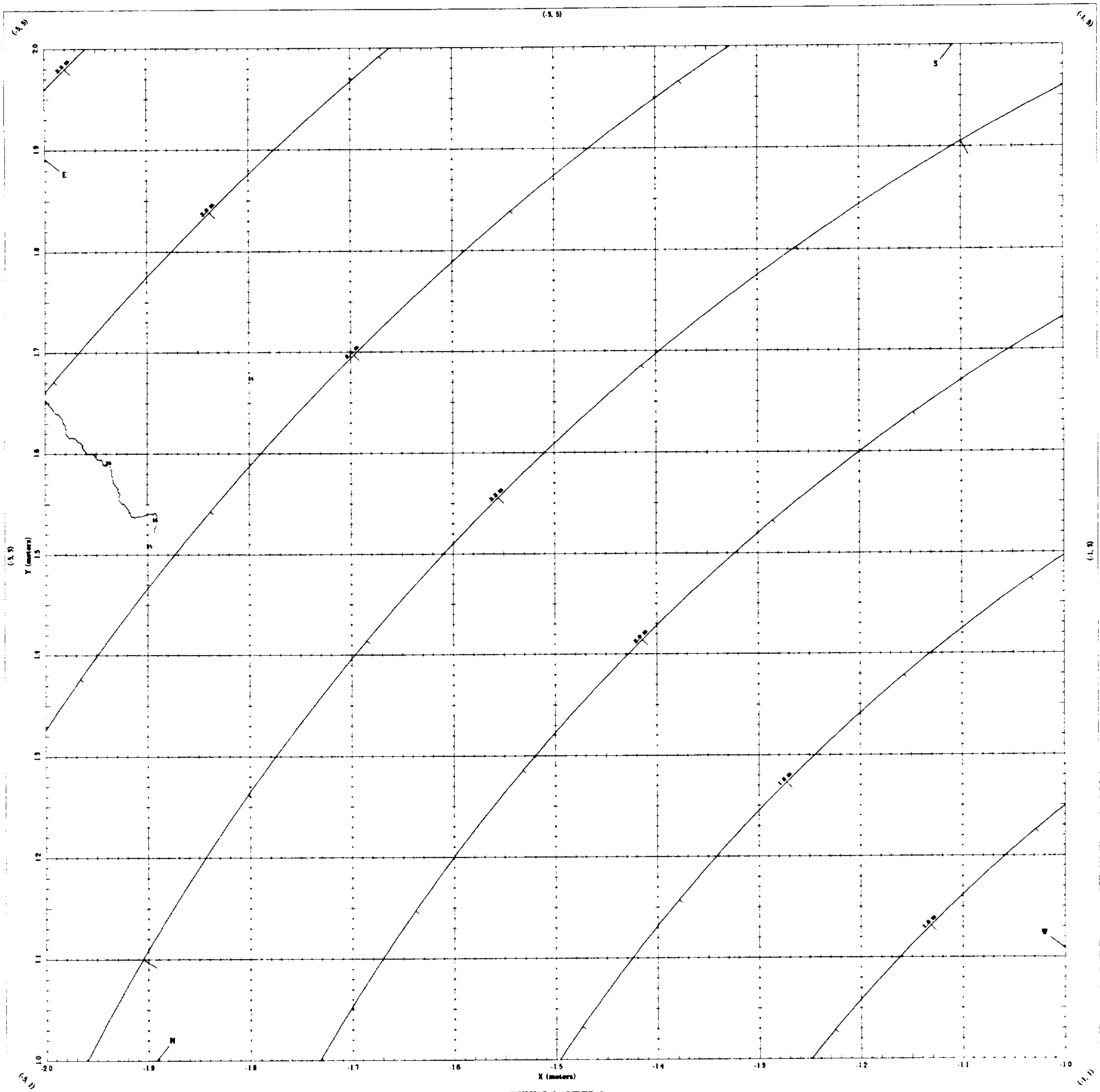
(-5, 1)

Range Data Set Files

JPL	Stanford
L1.RDSC FRONT VT1026	L1CFP
L1.RDSC EDR FRONT	L1CFA
L1.RDSC BACK	L1CBP
L1.RDSC EDR BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory under contracts [illegible] and JPL [illegible] and grant [illegible]

[illegible] OCTOBER [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 2 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

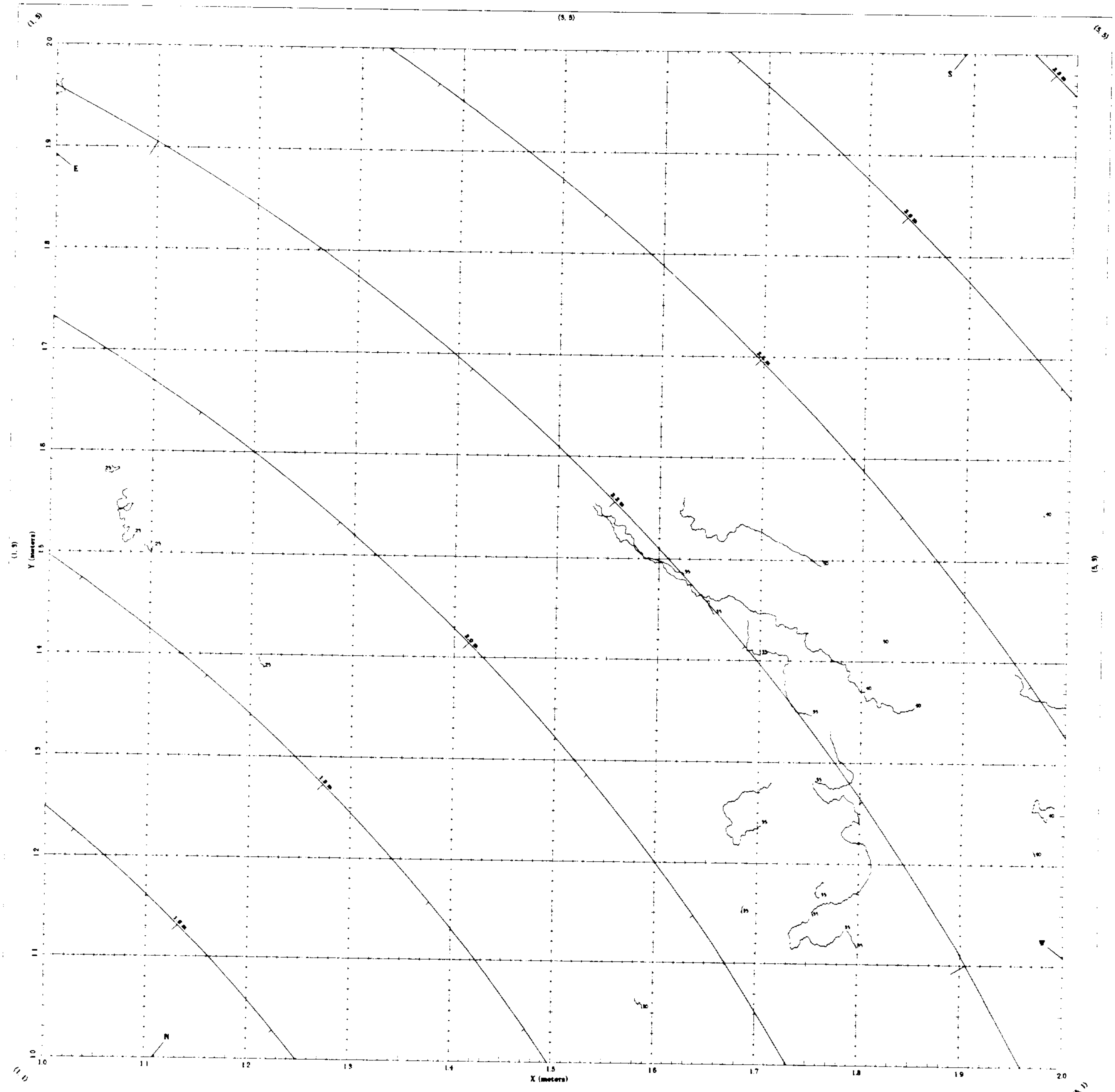
(-3, 1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953749, and grant NSG 7538

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis

VIKING LANDER 1

SCALE 1 : 2 SHEET (3, 3)

(Elevations (interval variable) in meters.)

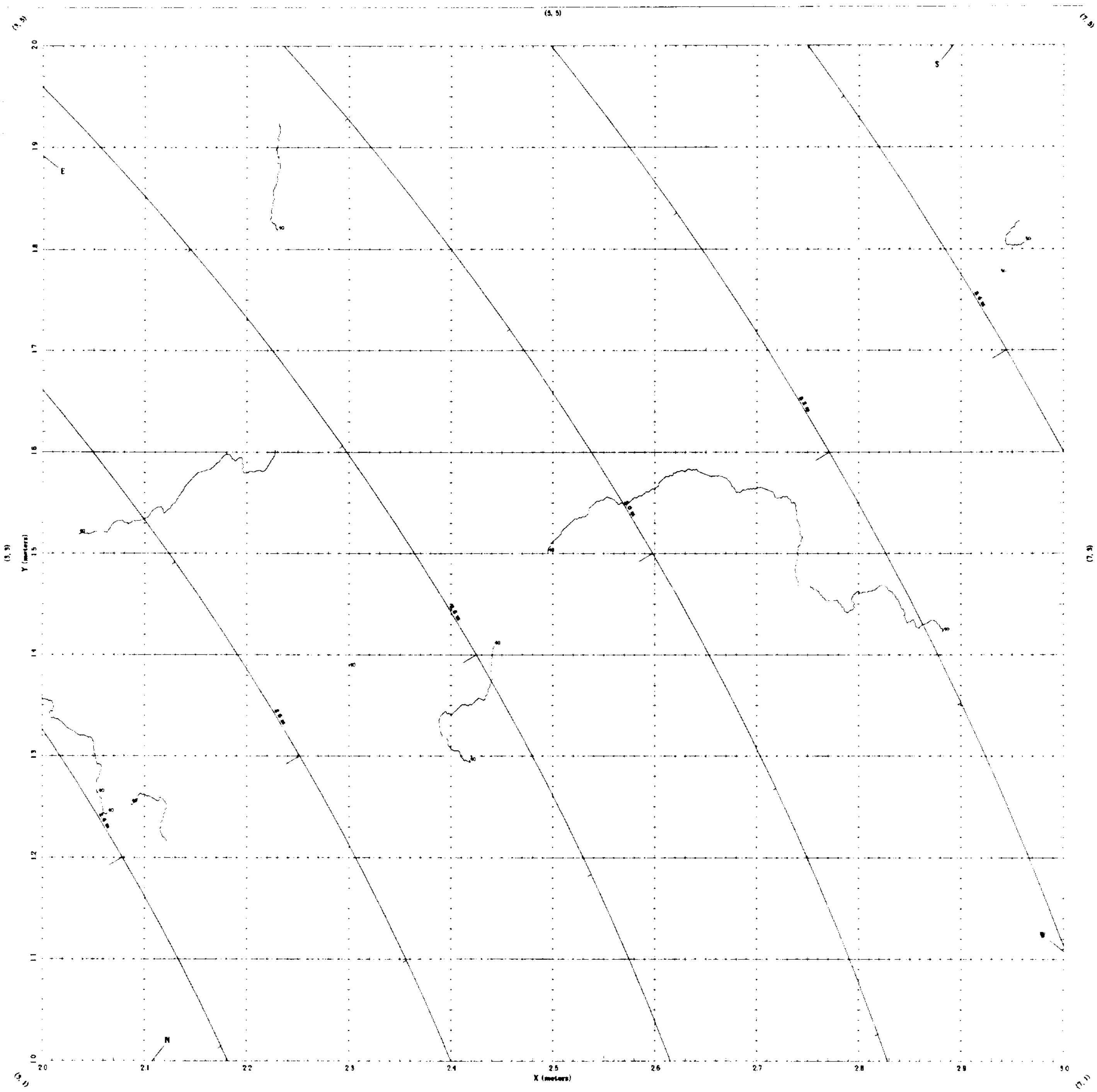
(3, 1)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1025	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing facilities of the [illegible] Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 955349 and grant NSG 1538

[illegible] OCTOBER 197[illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 2 SHEET (5, 3)

(Elevations (interval variable) in meters.)

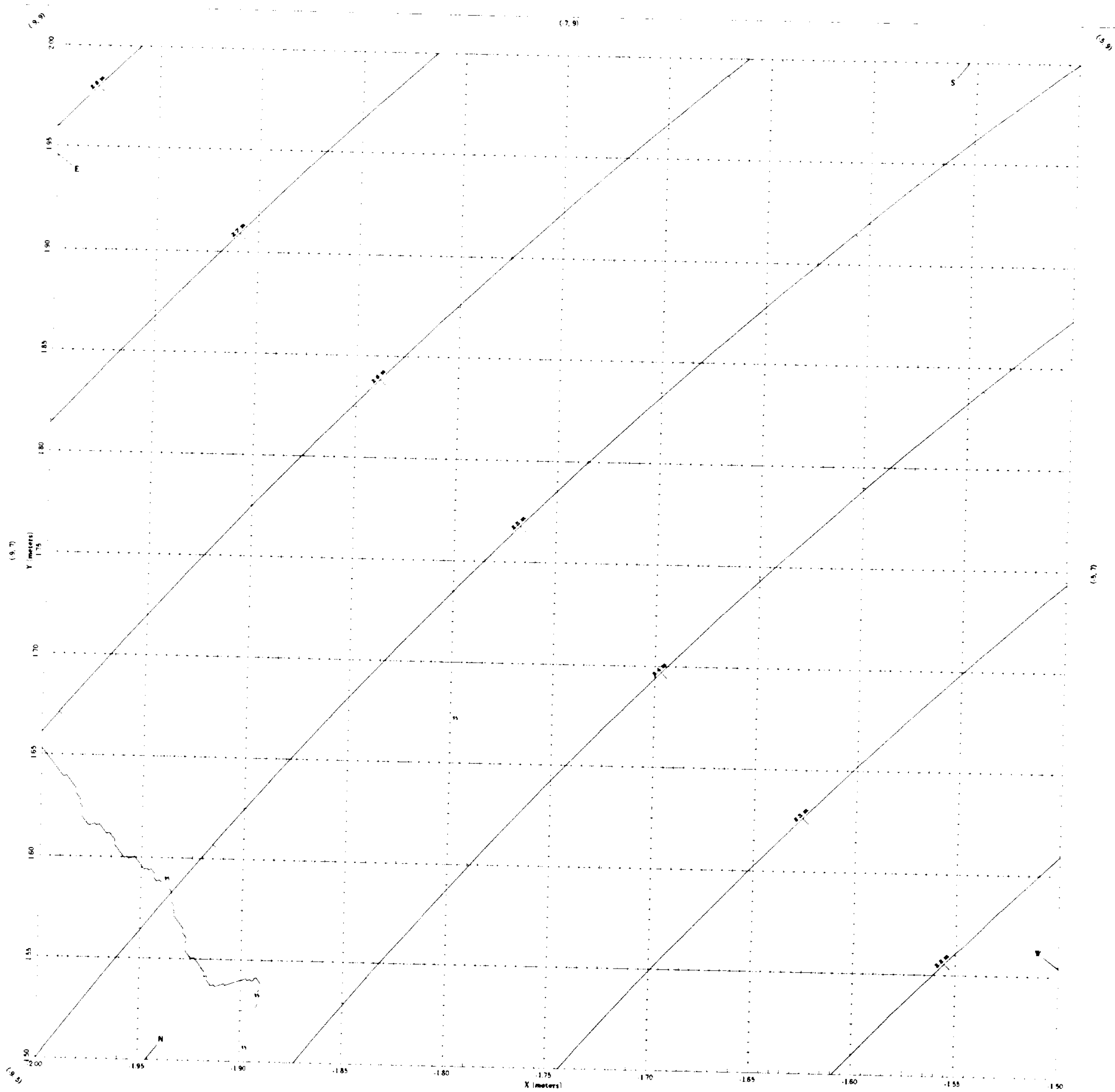
(5, 1)

Range Data Set Files

JPL:	Stanford:
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts N 451-9682 and JPL 955249, and grant NSG 7138.

USGS/SG/2715 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.905 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 1 SHEET (-7, 7)

(Elevations (interval variable) in meters.)

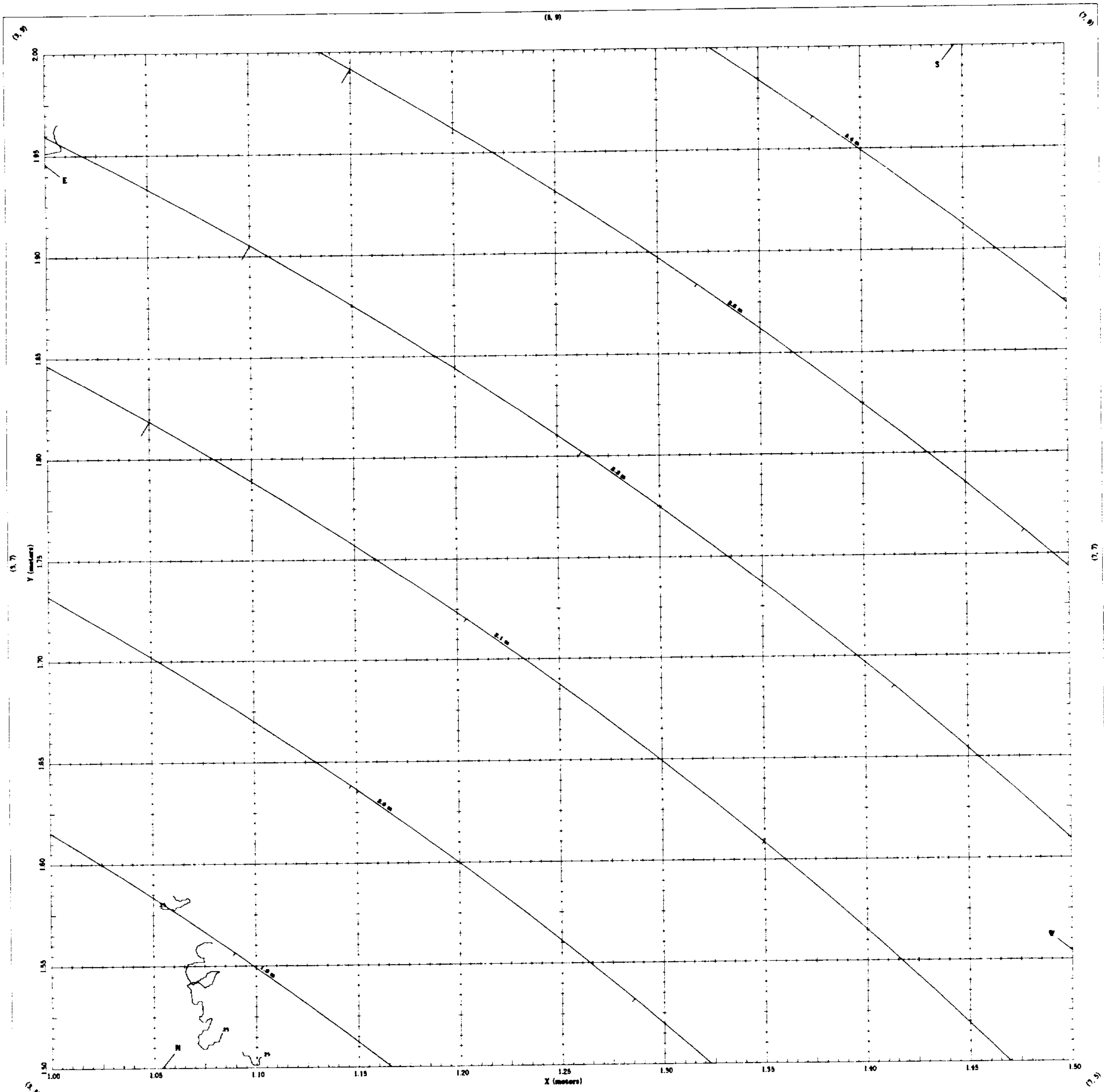
(-7, 5)

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1025	L1CFP
L1.RDSC.EDR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract NAS1-9682 and JPL 954349 and grant NSG-7148.

OCTOBER 1979



VIKING LANDER 1

SCALE 1 : 1 SHEET (5, 7)

(Elevations (interval variable) in meters.)

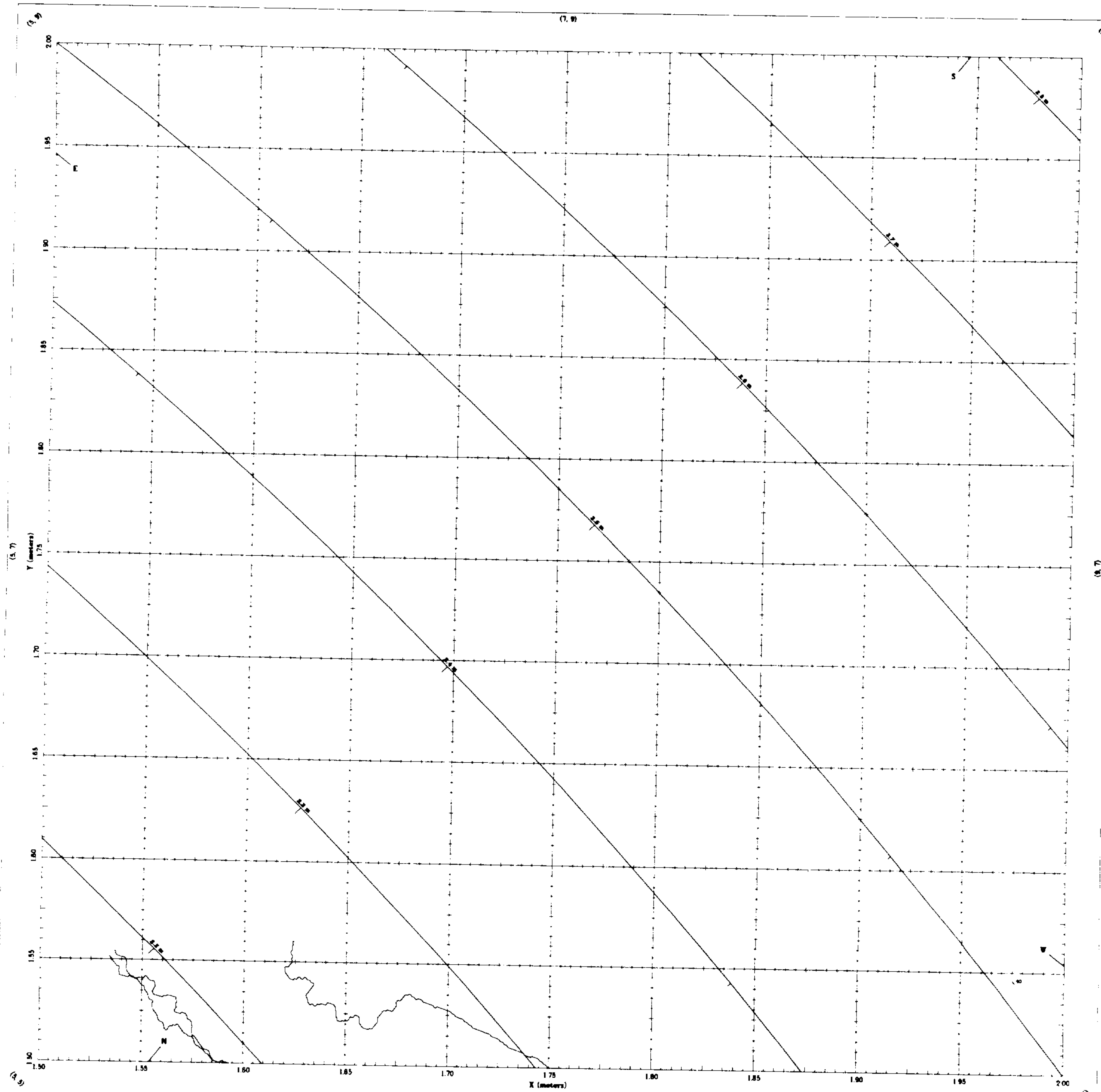
(5, 5)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis

Range Data Set Files

JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EOR.FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EOR.BACK	L1CBA

OCTOBER 1976



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis

VIKING LANDER 1

SCALE 1 : 1 SHEET (7, 7)

(Elevations (interval variable) in meters.)

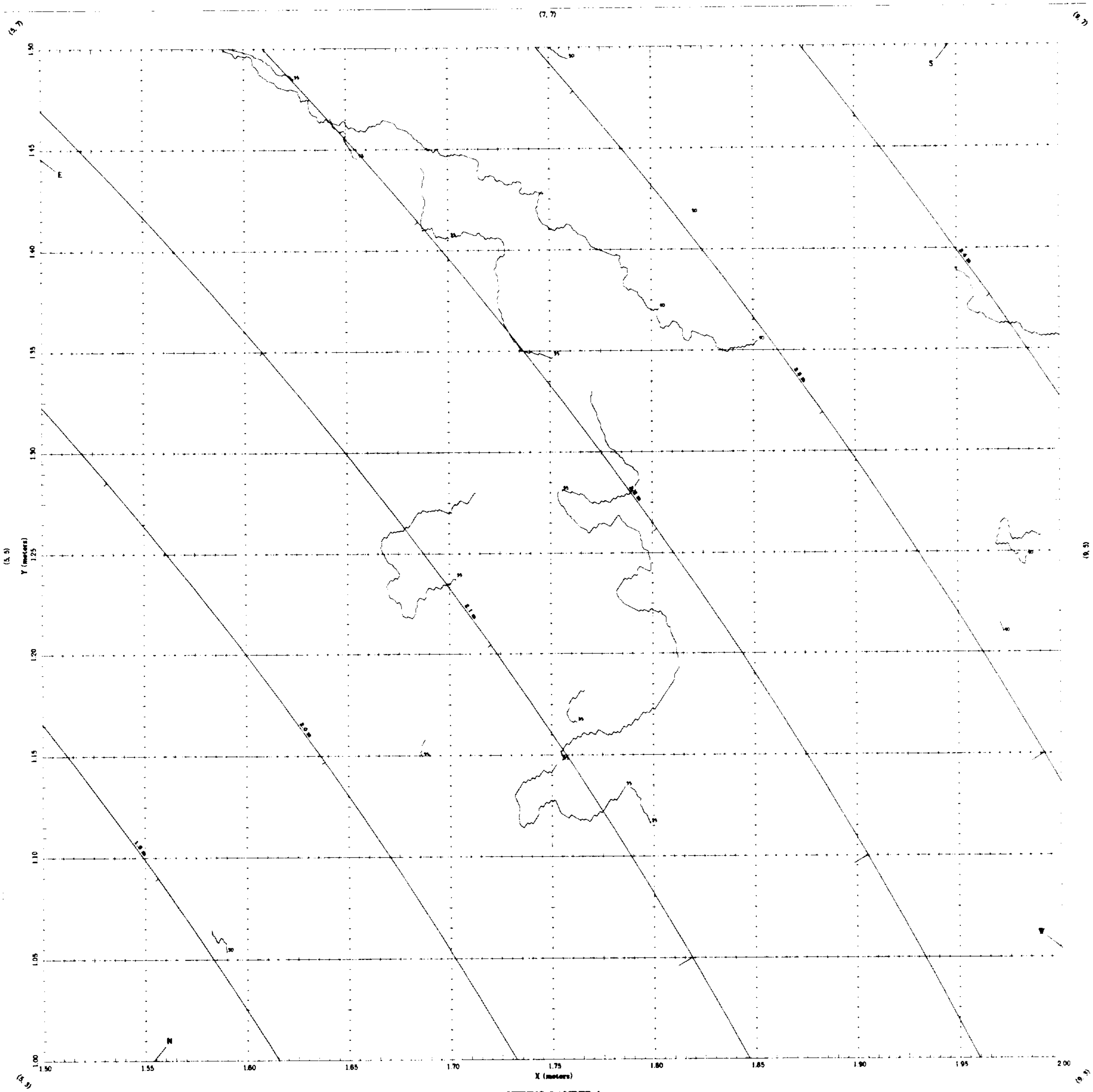
(7, 5)

Range Data Set Files

JPL	Stanford
L1.ROSC.FRONT VT1026	L1CFP
L1.ROSC.EOR.FRONT	L1CFA
L1.ROSC.BACK	L1CBP
L1.ROSC.EOR.BACK	L1CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 141.806 degrees CCW from the LGN positive y-axis.

VIKING LANDER 1

SCALE 1 : 1 SHEET (7, 5)

(Elevations (interval variable) in meters.)

(7, 3)

Range Data Set Files JPL	Stanford
L1.RDSC.FRONT.VT1026	L1CFP
L1.RDSC.EDR FRONT	L1CFA
L1.RDSC.BACK	L1CBP
L1.RDSC.EDR BACK	L1CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract JPL 955249, and grant NSG 7538.

OCTOBER 1979

5. VERTICAL PROFILES

5.1 Vertical Profile Mosaic Overlay Stereo Pairs

This section contains mosaic stereo pairs of images into which have been overlayed the systematic vertical profiles. The general remarks of section 4.1 apply.

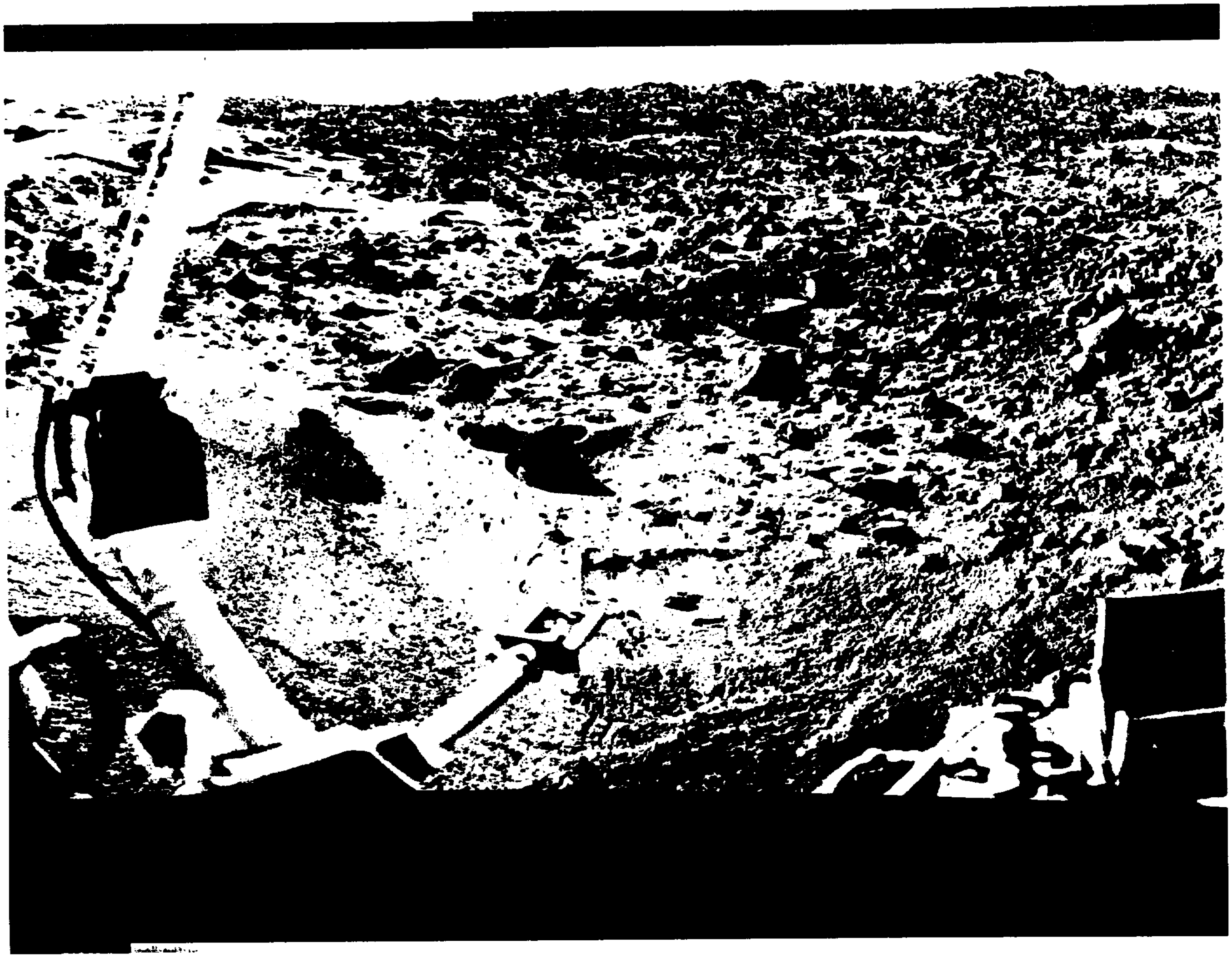


Fig. 19. Vertical Profile Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/07/15/102049.

Fig. 20. Vertical Profile Overlay Mosaic: Camera 2 (right), front left quadrant — from IPL PIC ID 79/06/06/021223.

Fig. 21. Vertical Profile Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/07/15/102049.

Fig. 22. Vertical Profile Overlay Mosaic: Camera 2 (right), front right quadrant — from IPL PIC ID 79/06/06/021223.

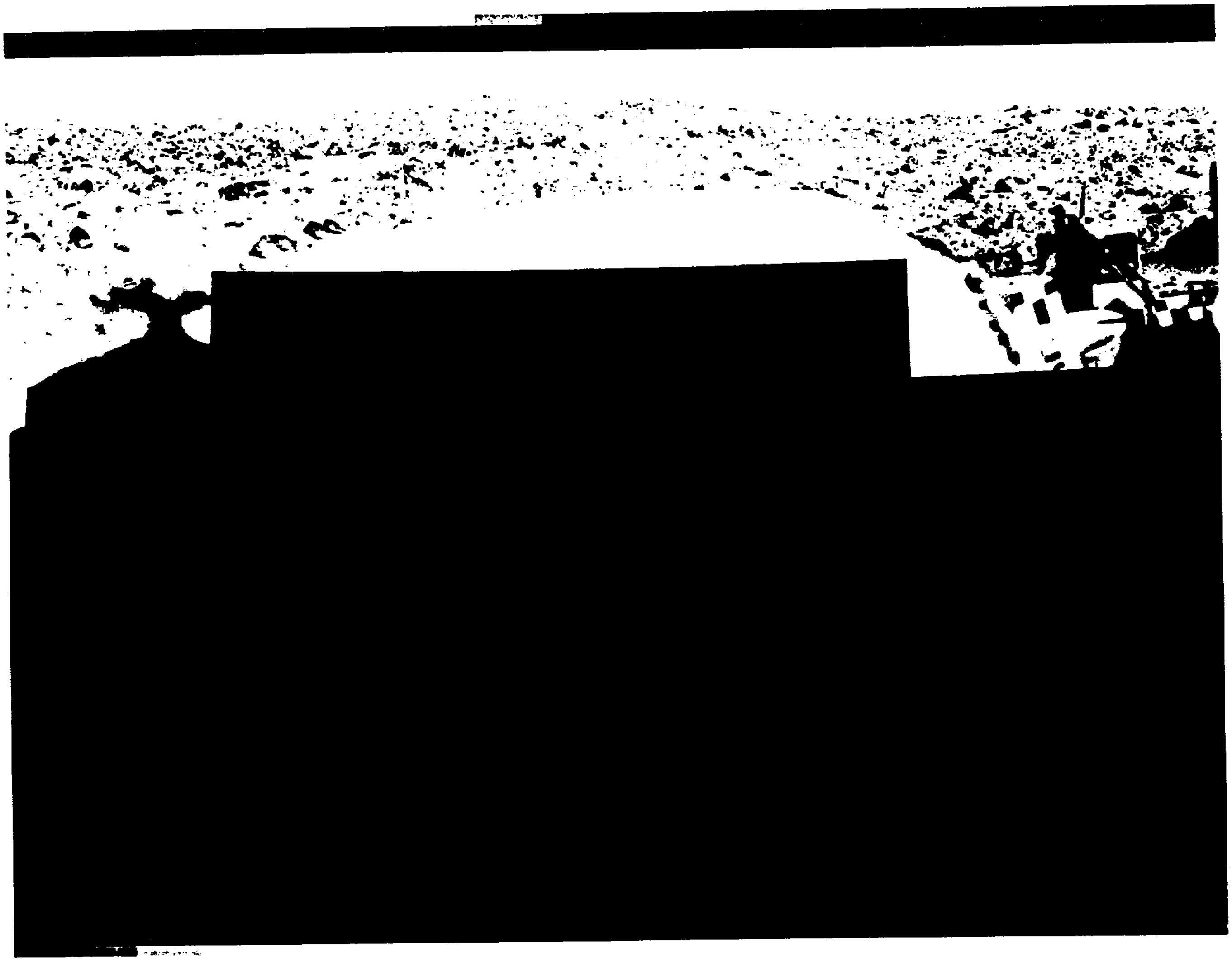


Fig. 23. Vertical Profile Overlay Mosaic: Camera 2 (left), back left quadrant from IPL PIC ID 79/07/15/113640.

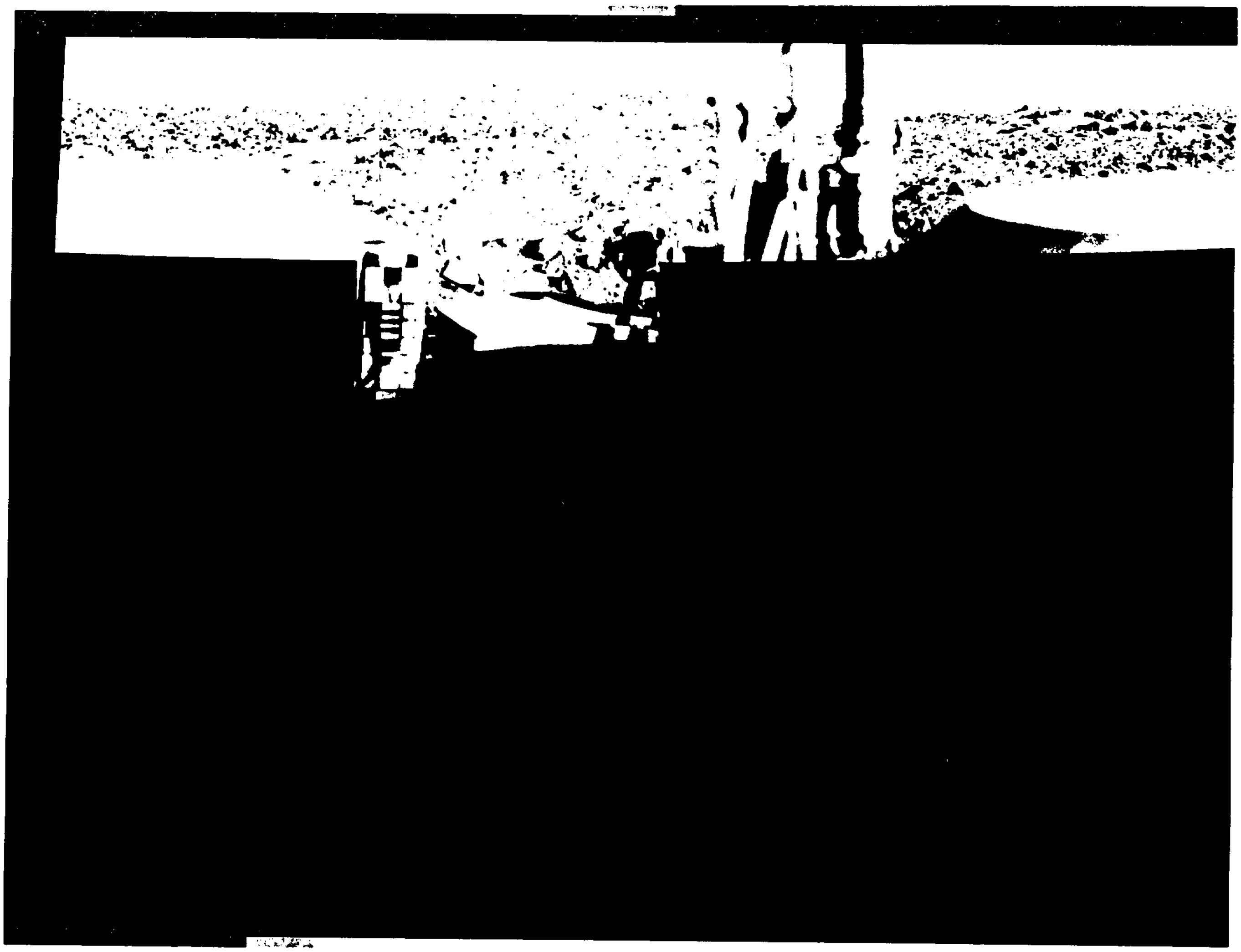


Fig. 24. Vertical Profile Overlay Mosaic: Camera 1 (right), back left quadrant – from IPL PIC ID 79/03/20/044430.

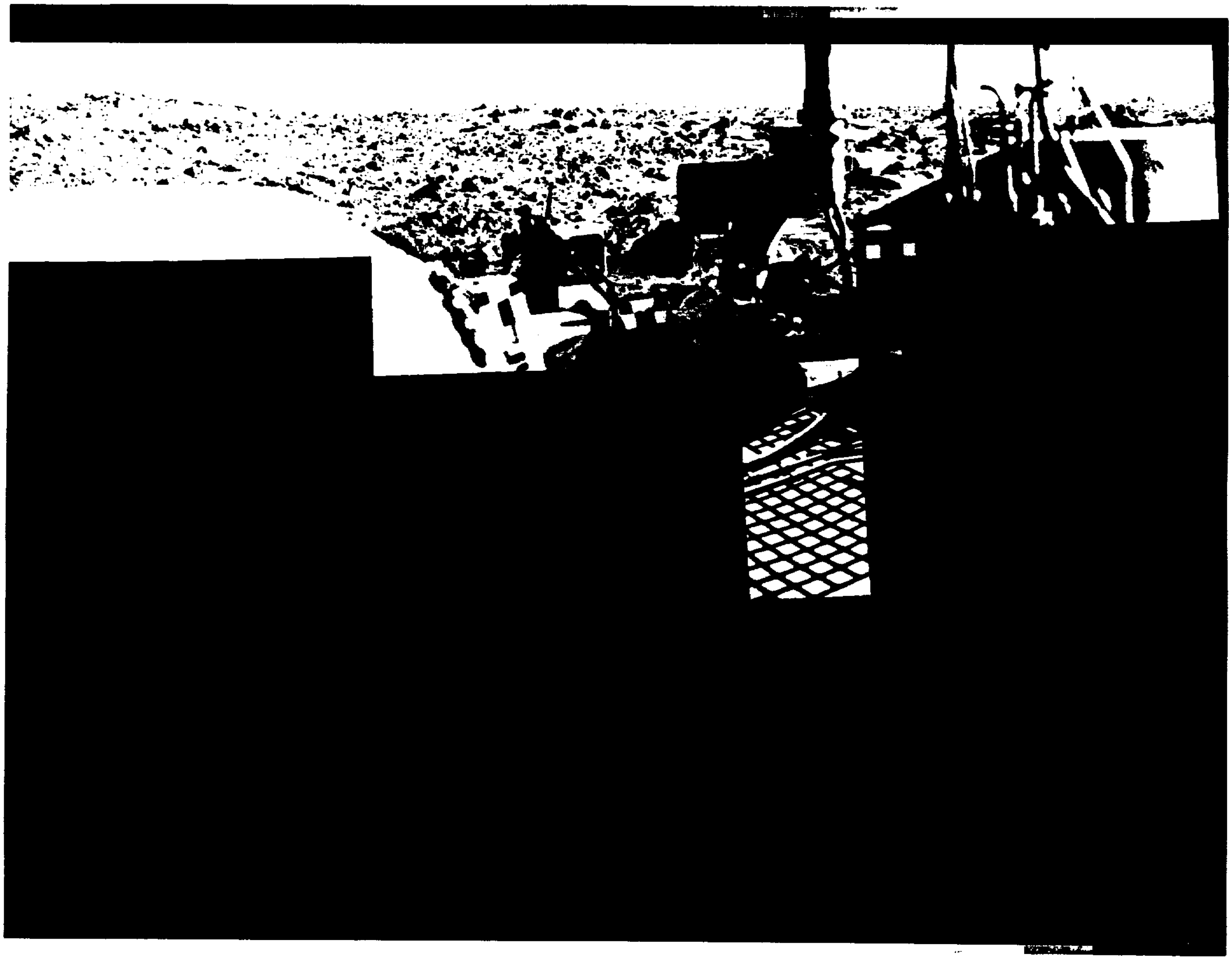


Fig. 25. Vertical Profile Overlay Mosaic: Camera 2 (left), back right quadrant — from IPL PIC ID 79/07/15/113640.

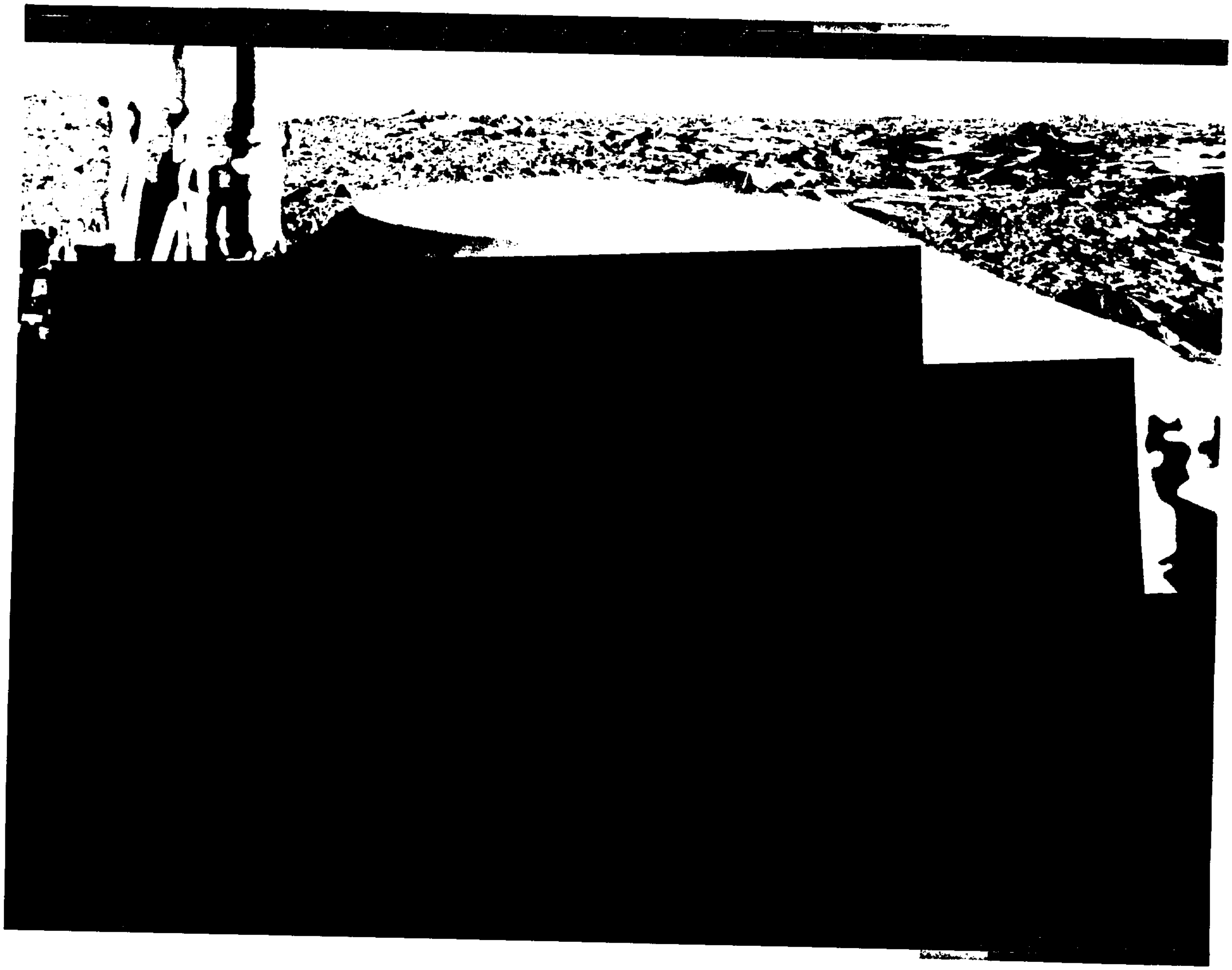


Fig. 26. Vertical Profile Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/03/20/044430.

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5.2 Camera Perspective Annotated Vertical Profiles — Camera 1

This section contains camera-1 perspective representations of the elevation contour map data. The nature and purpose of these representations has been explained in section 3.2.1. On opposing pages are presented mosaic overlays of the elevation contour lines, and corresponding camera perspective representation of the map data, with the individual lines of the map data annotated with elevation values. The general discussion of section 4.1 applies to the mosaics of this section.

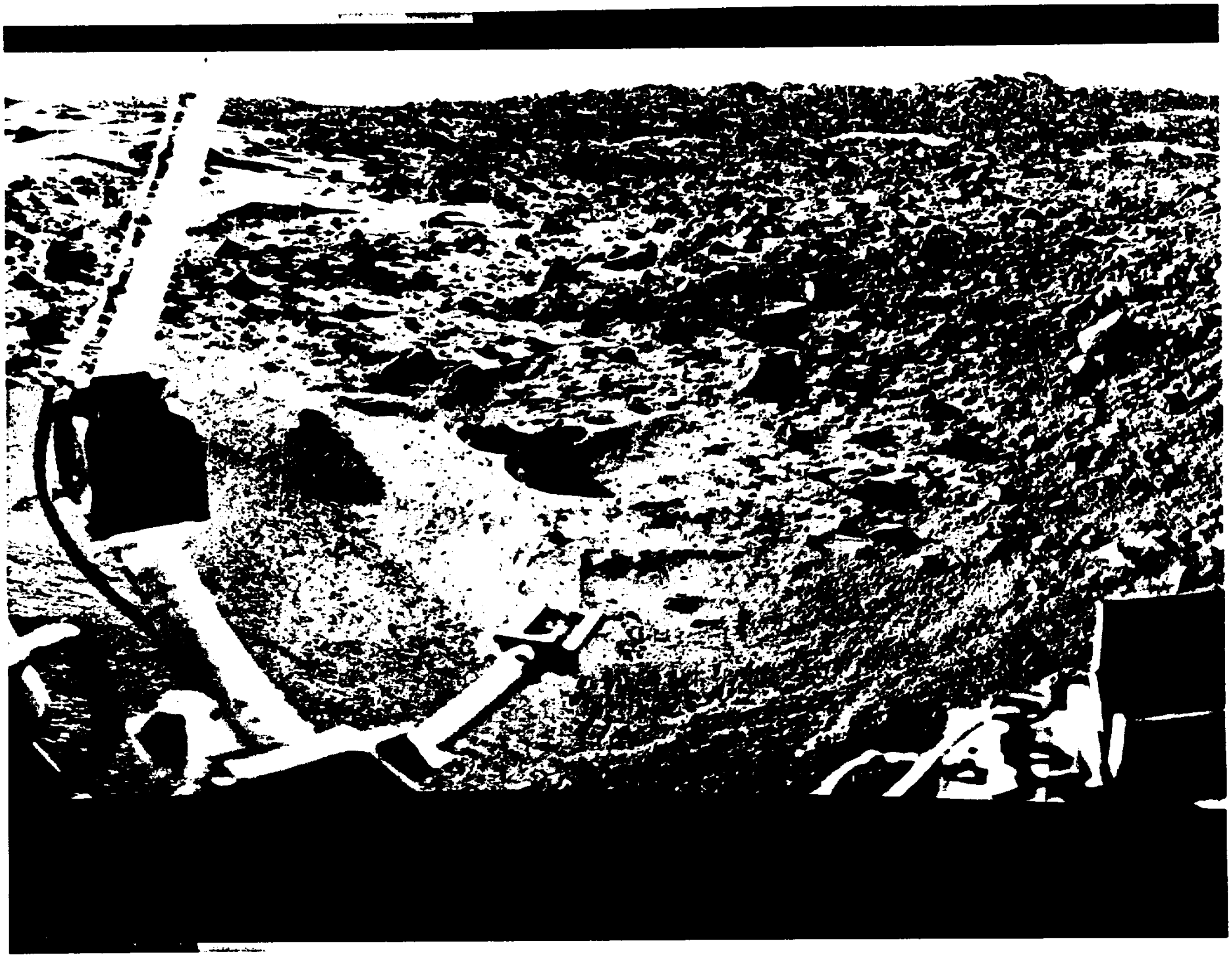


Fig. 27. Vertical Profile Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/07/15/102049.

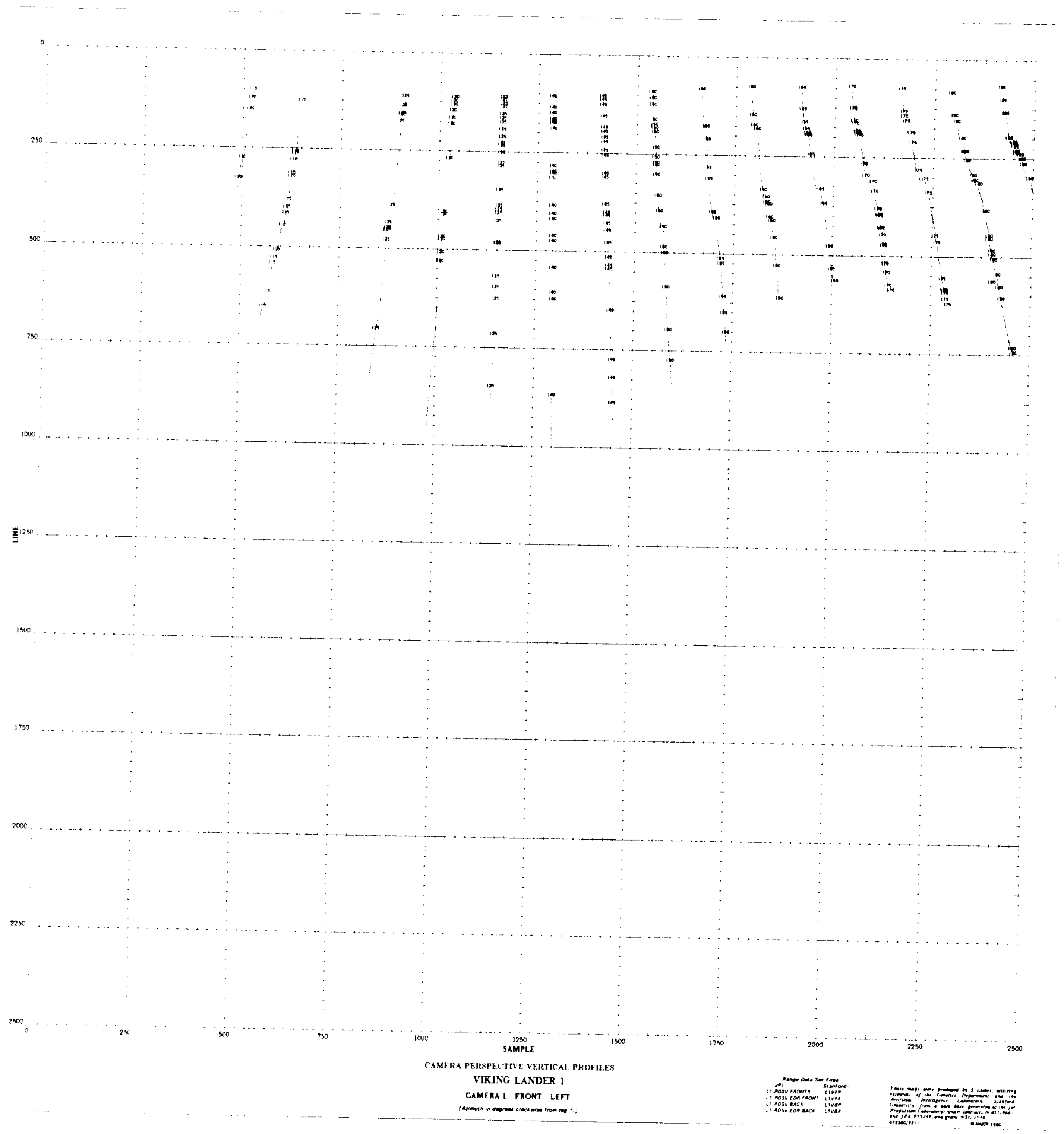


Fig. 28. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), front left quadrant.

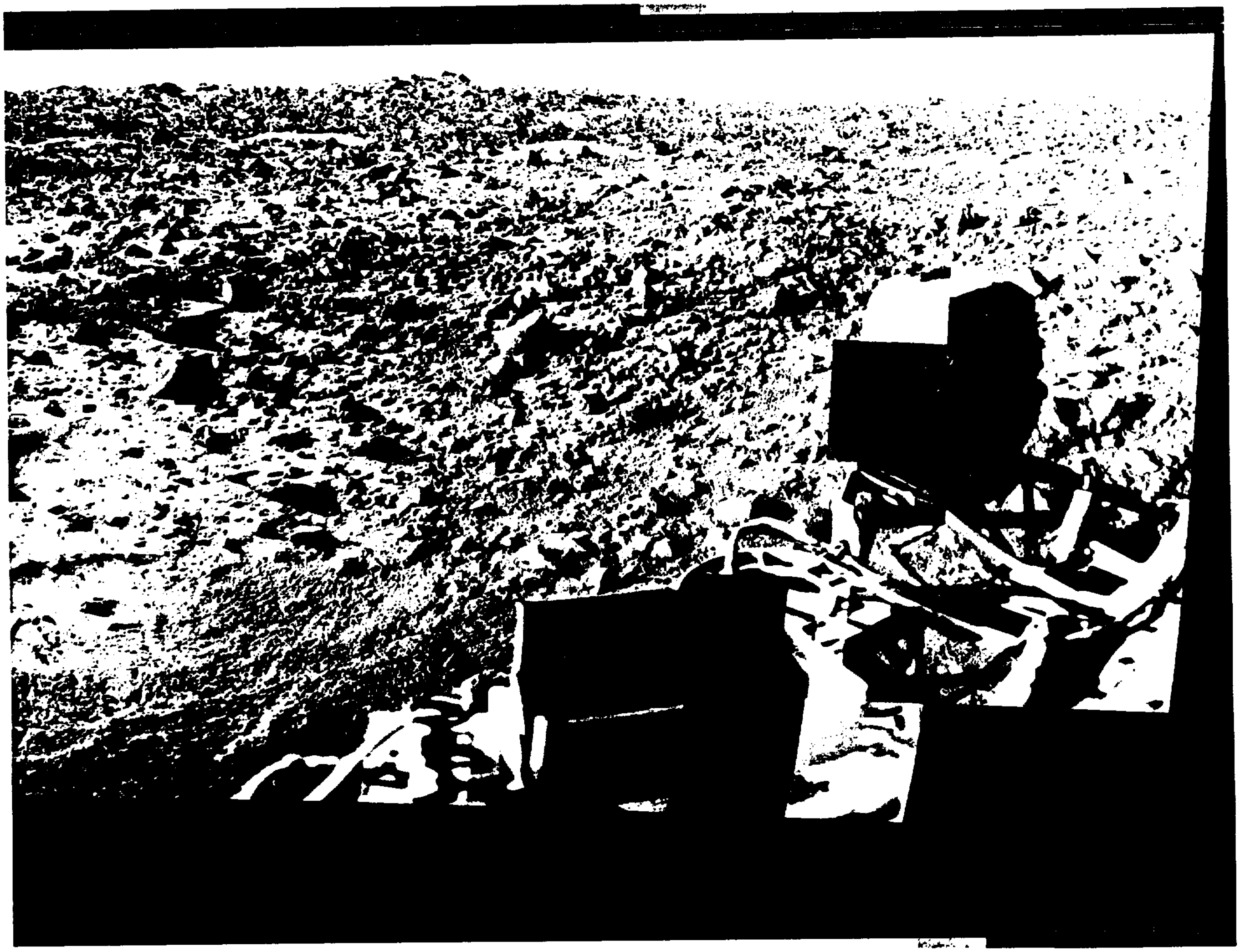


Fig. 29. Vertical Profile Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/07/15/102049.

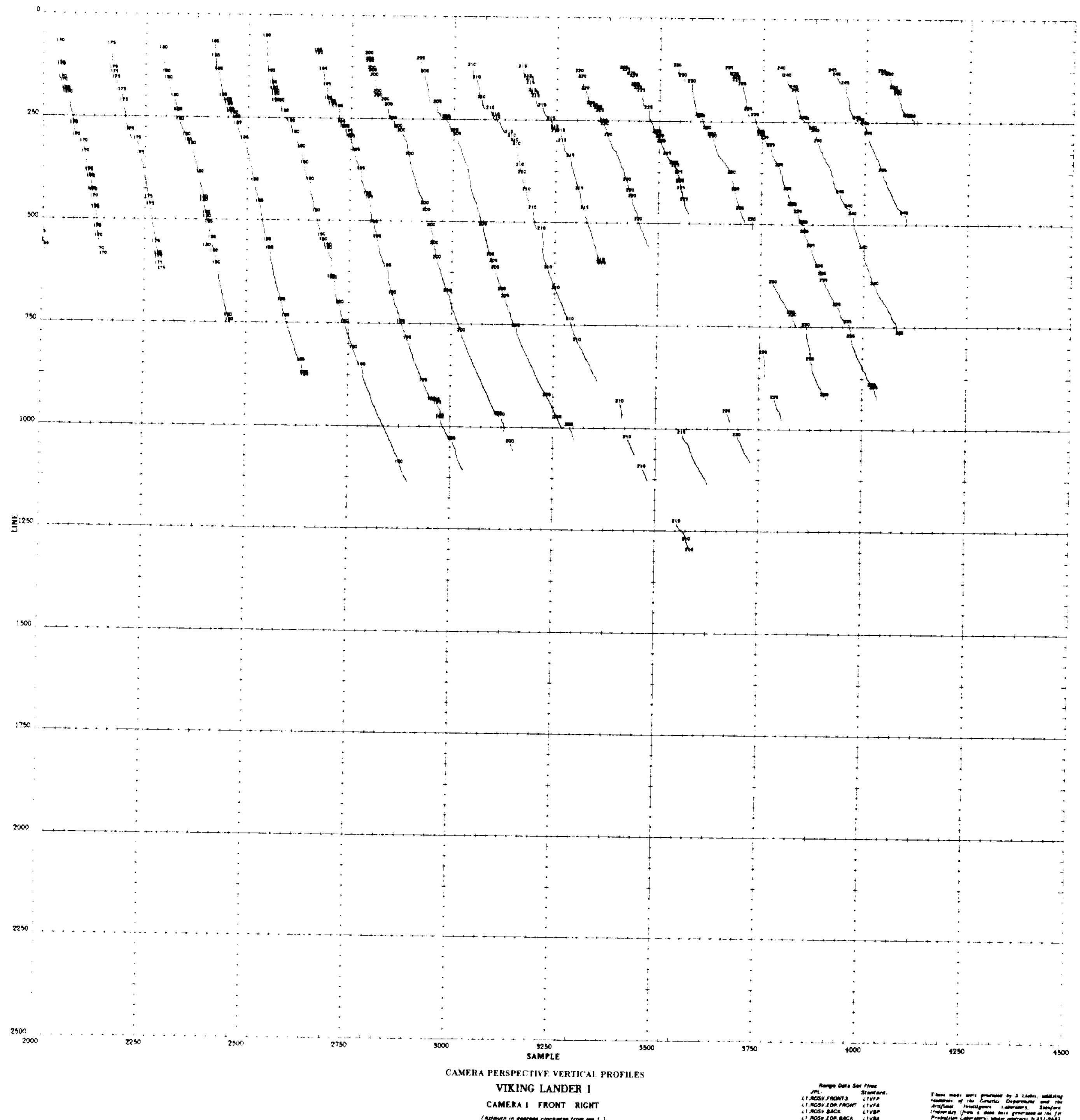


Fig. 30. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), front right quadrant.

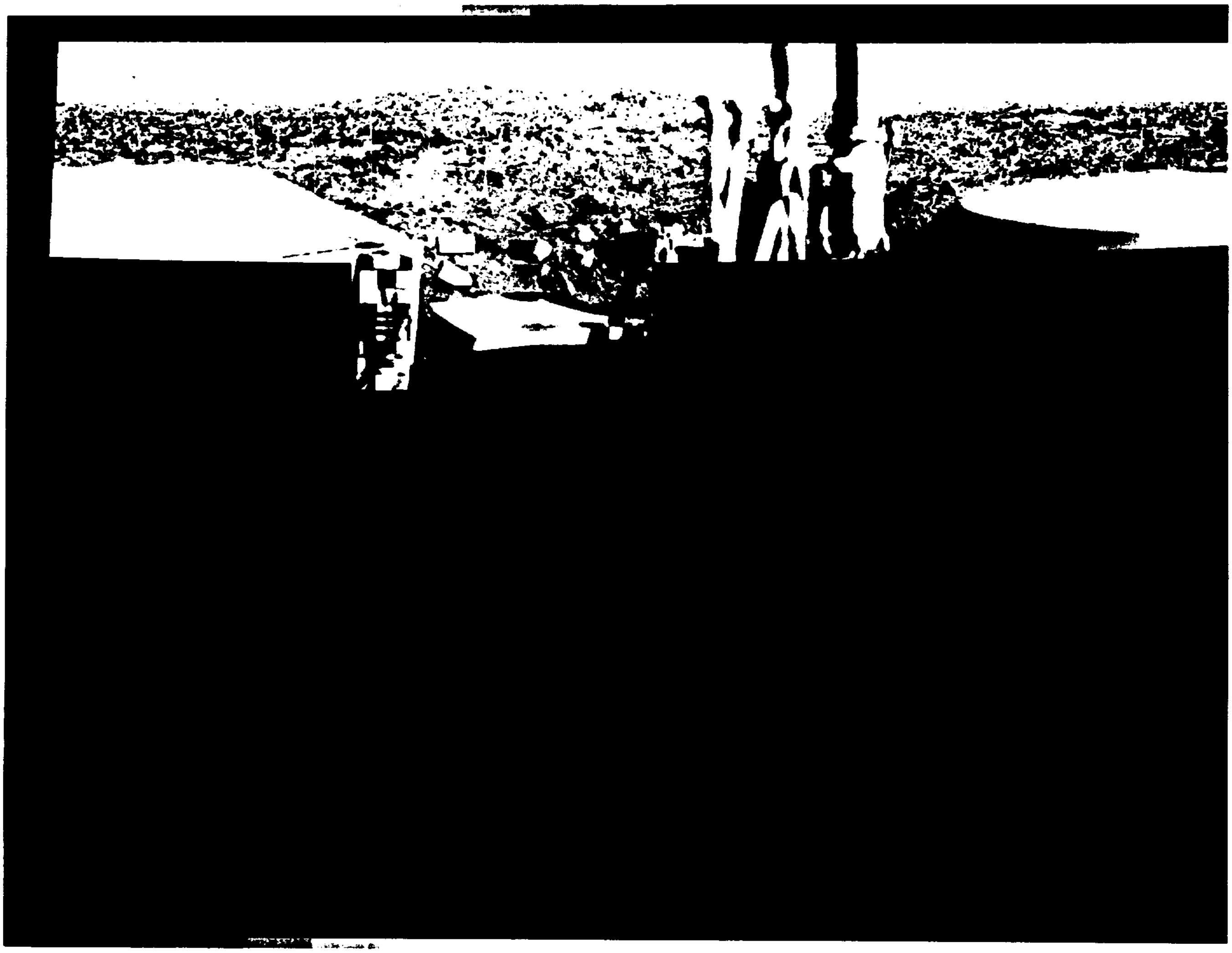


Fig. 31. Vertical Profile Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/03/20/044430.

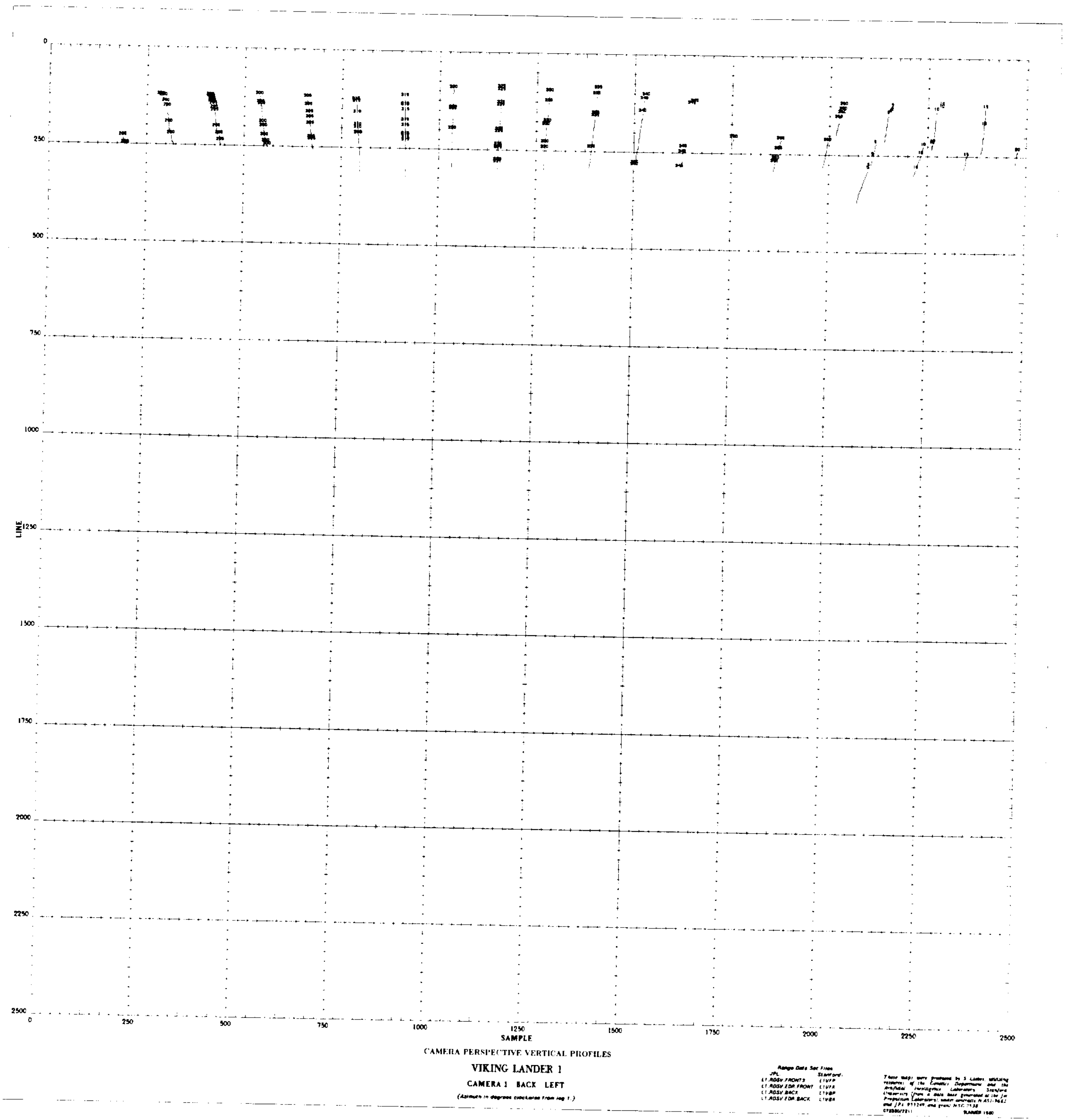


Fig. 32. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), back left quadrant.

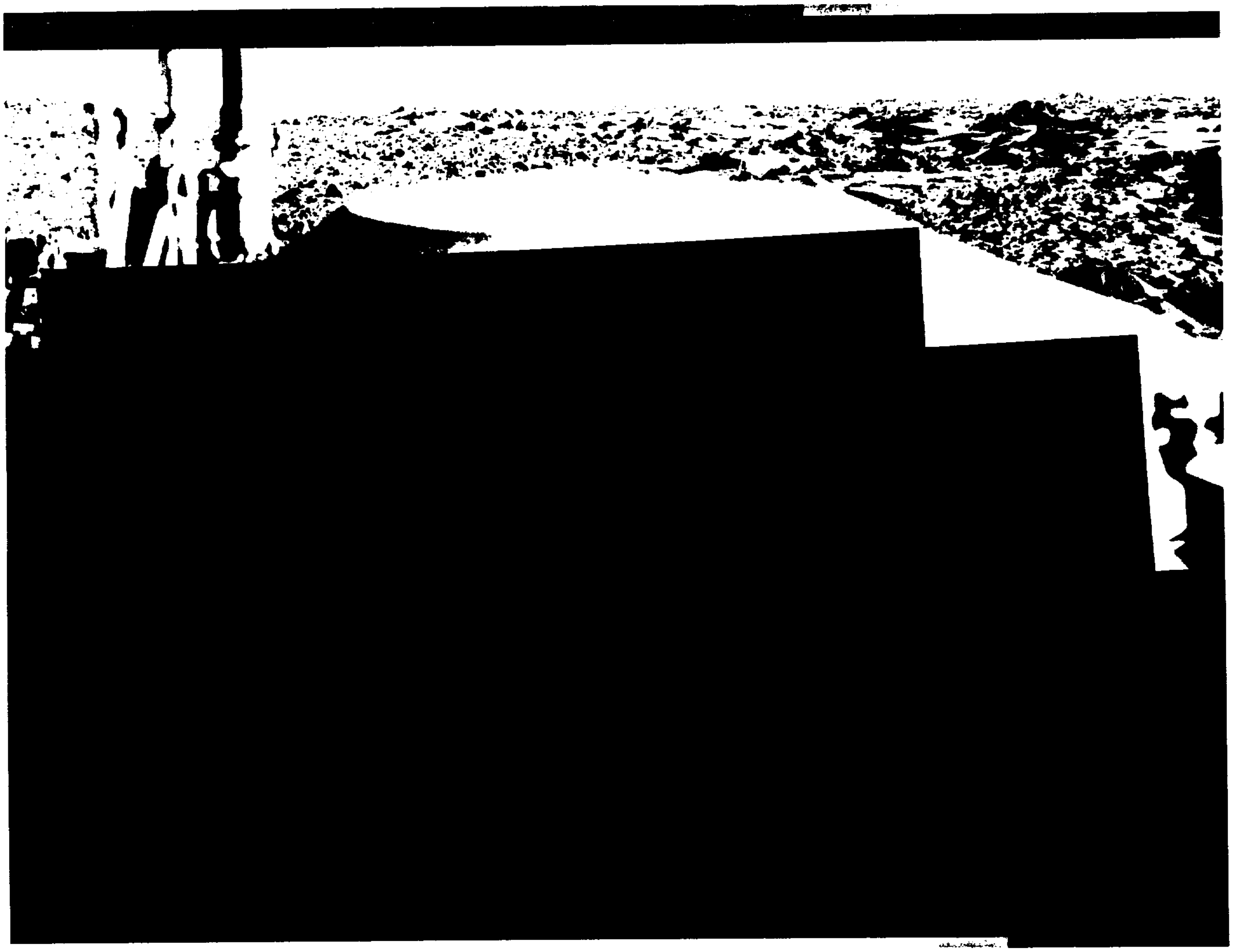


Fig. 33. Vertical Profile Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/03/20/044430.

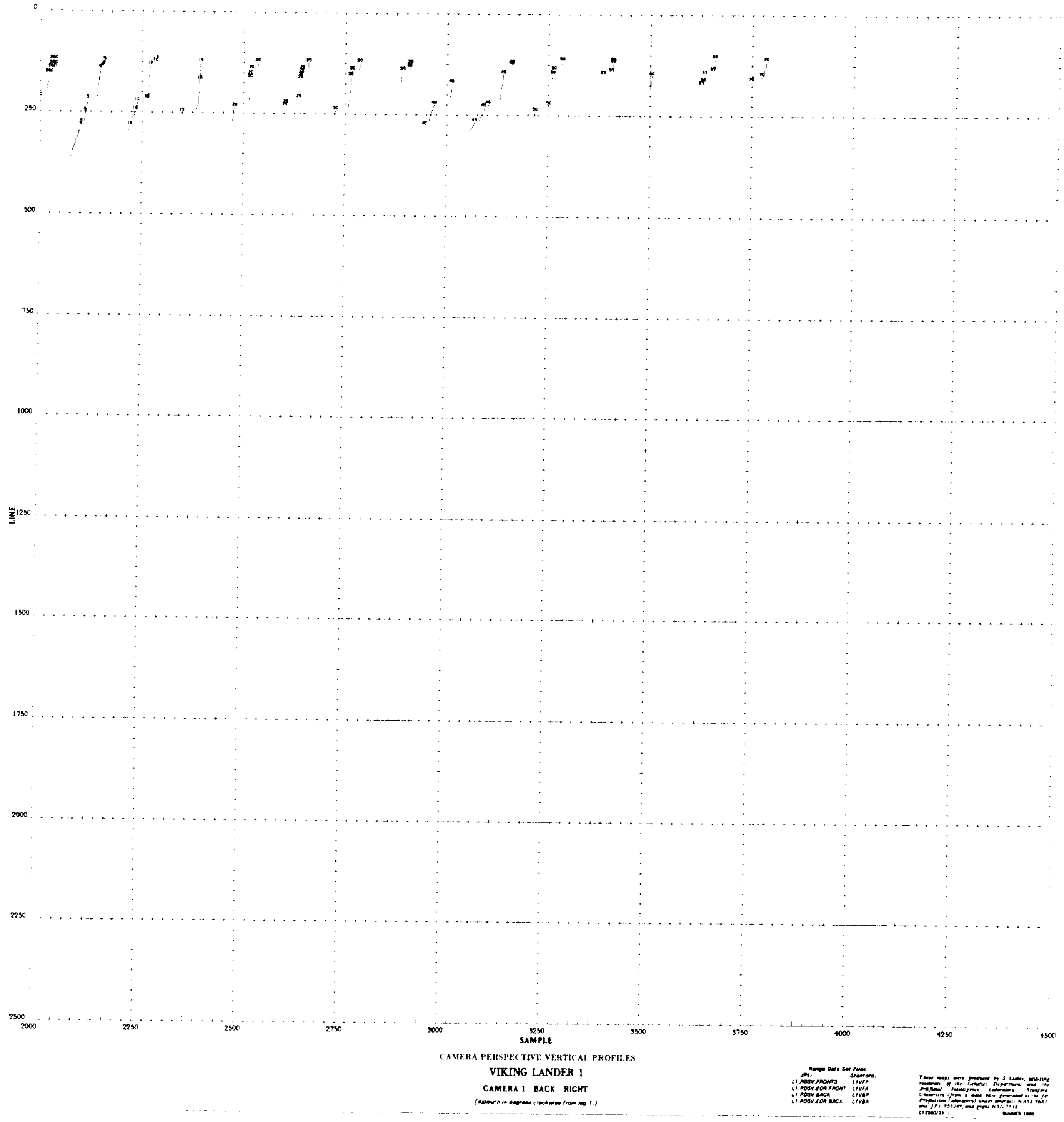
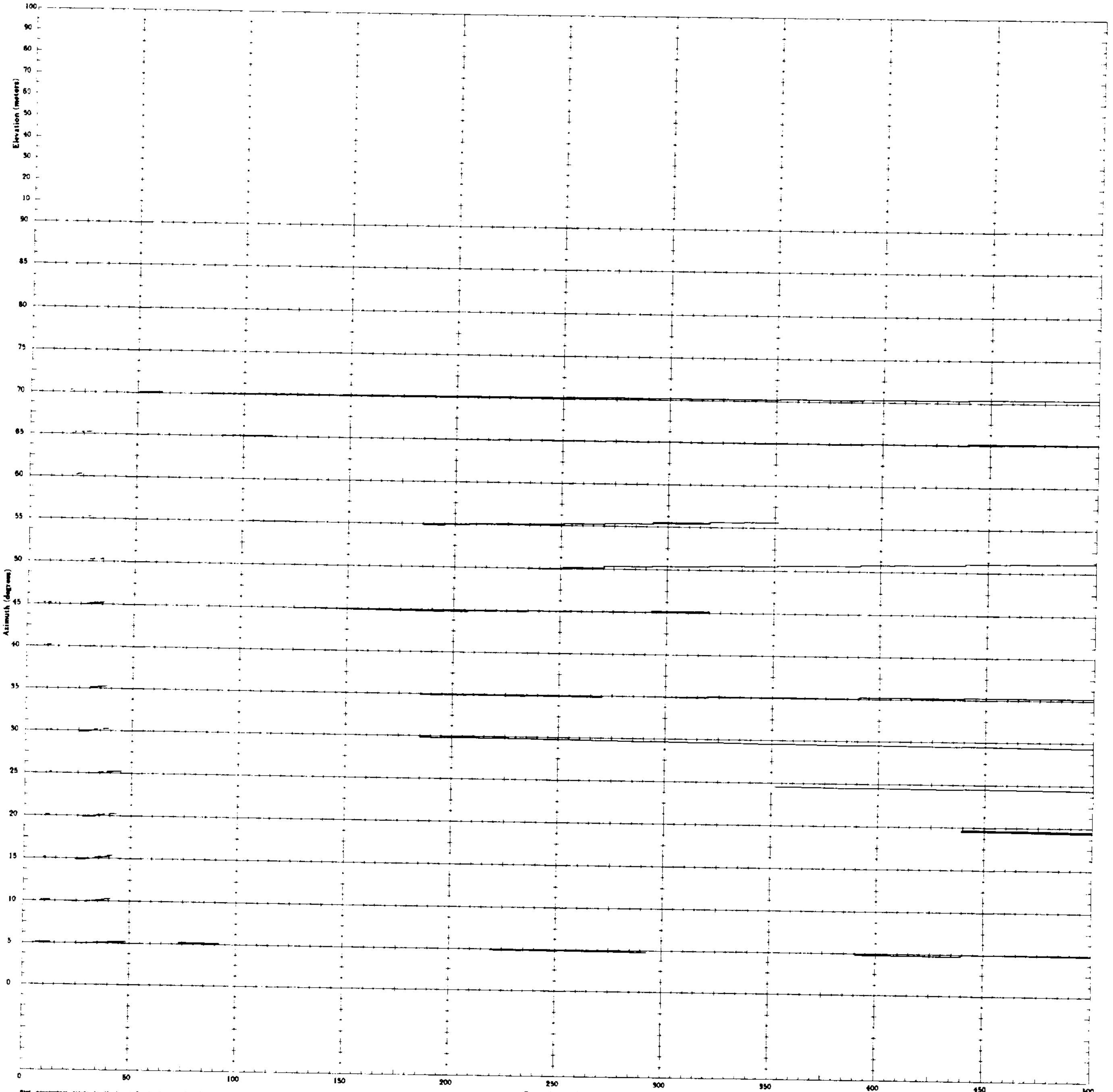


Fig. 34. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), back right quadrant.

5.3 Vertical Profile Sheet Collection

This section contains the vertical profile sheet collection. No tabulation of the kind preceding the elevation contour maps has been prepared. The sheets are ordered as follows. First, they are grouped by quadrant, in clockwise order starting from the back left quadrant (0 - 90°), then within each quadrant by order of decreasing scale number, and within each scale by order of increasing range.



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 1000 RANGE 0 TO 500 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

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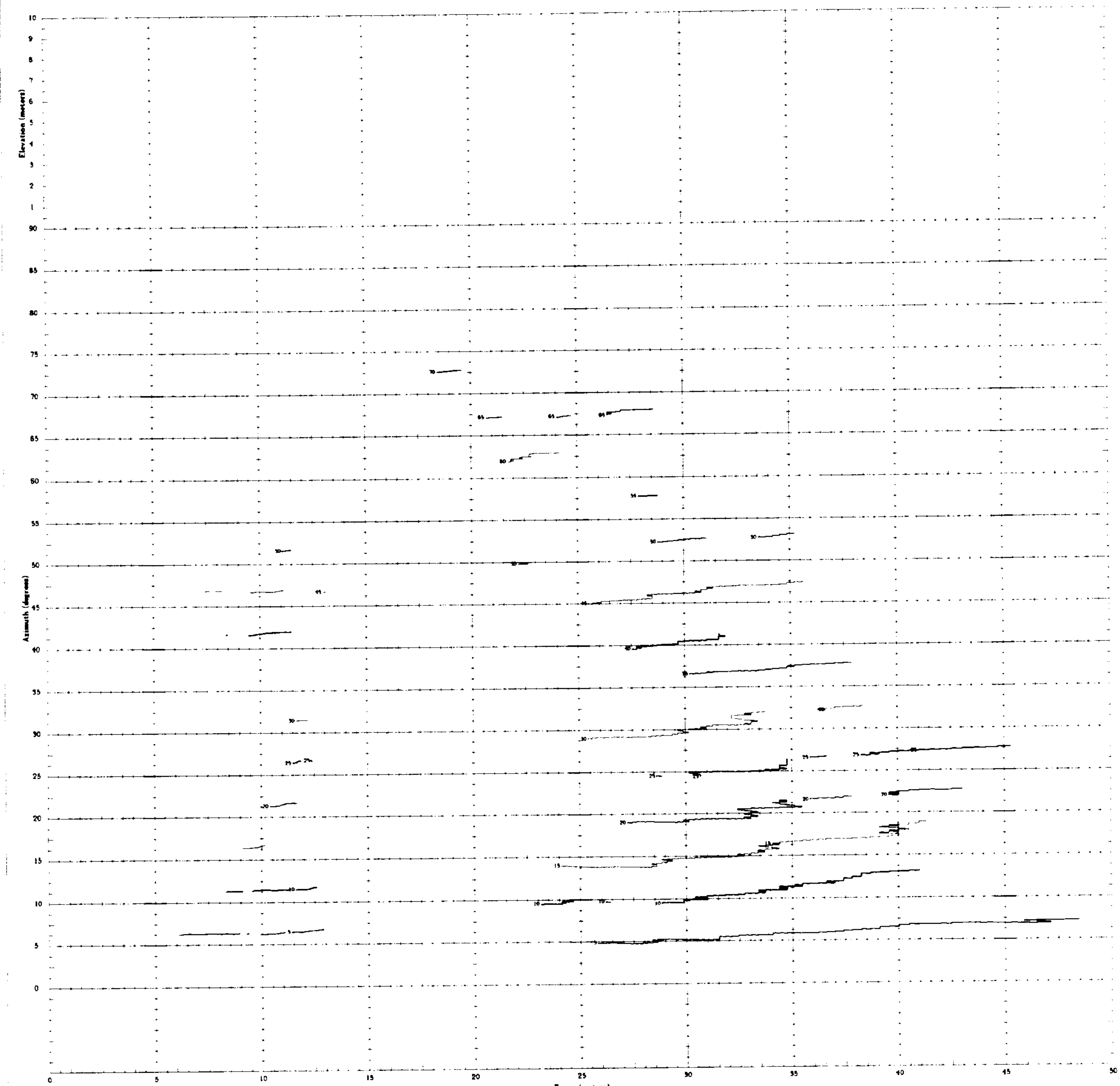
D04080/0095 APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

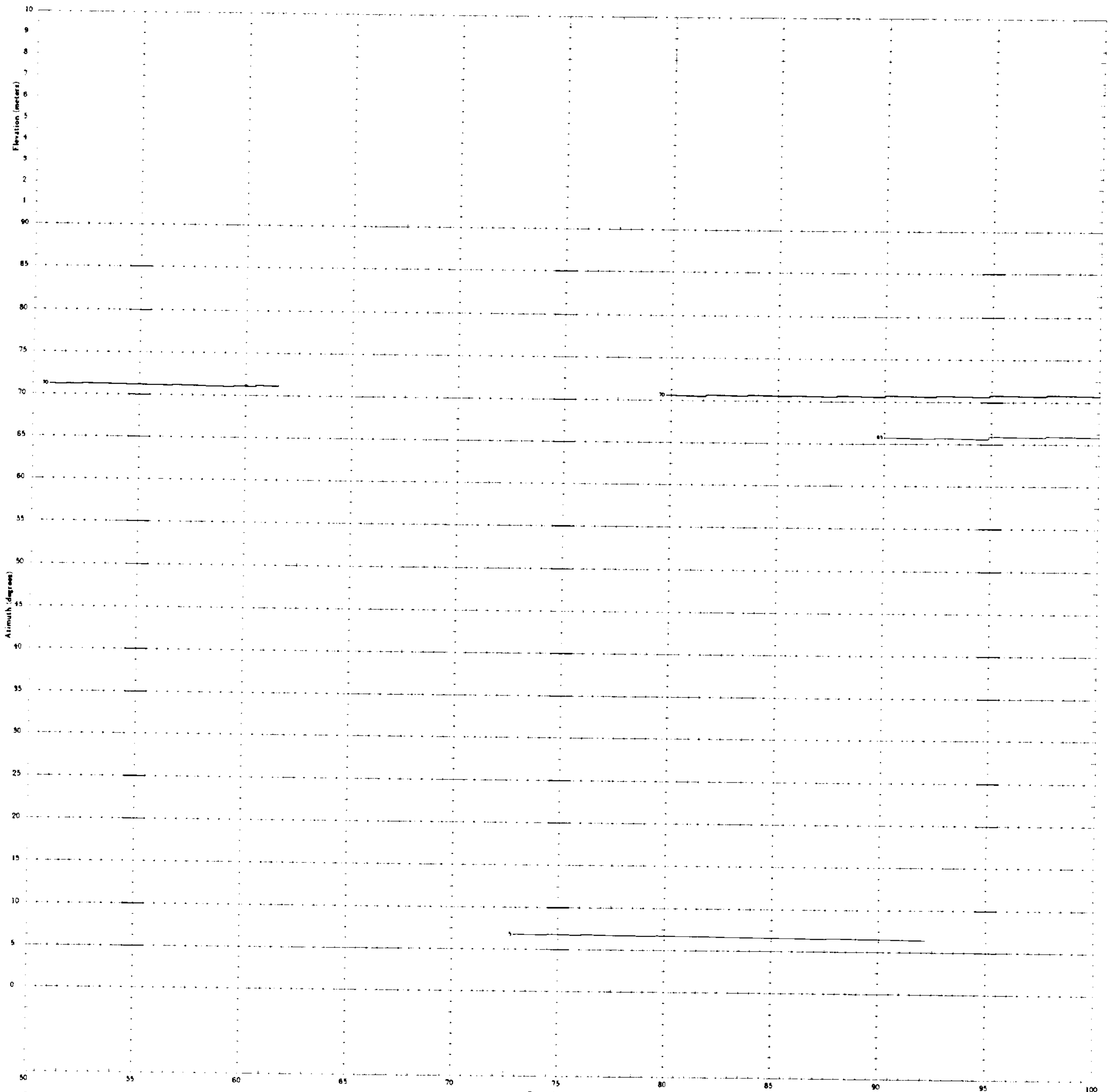
SCALE 1 : 100 RANGE 0 TO 50 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EOR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.FOR.BACK	L1VBA

These maps were produced by S. Liebes, ... resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts ... and JPL ... and grant ...

APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

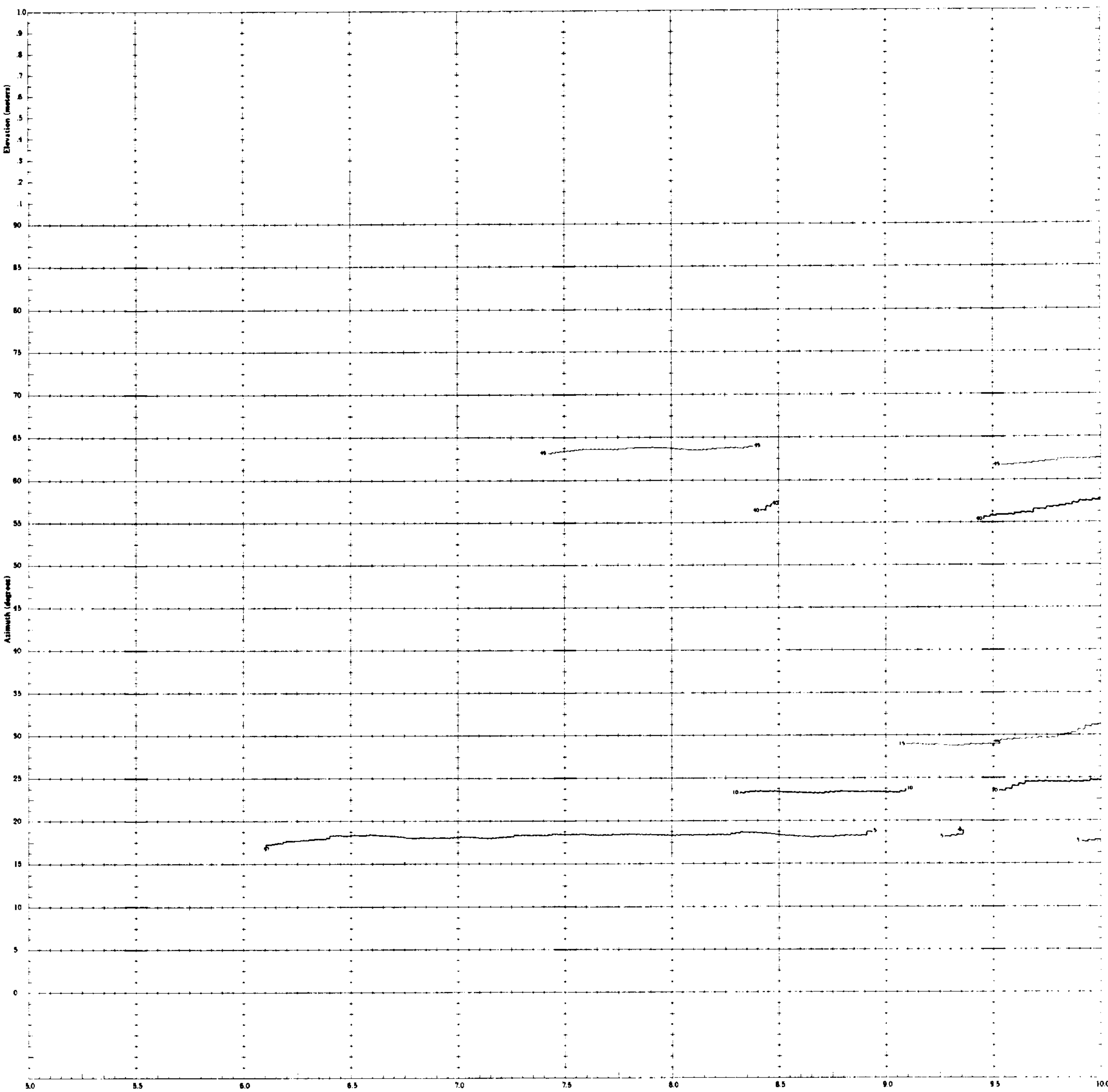
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 50 TO 100 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L1.ROSV.EDR.FRONT	L1VFA
L1.ROSV.FRONTS	L1VFP
L1.ROSV.BACK	L1VBP
L1.ROSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS7-9682 and JPL 951249, and grant NSG 7538.
0404ED/0055 APRIL 1980

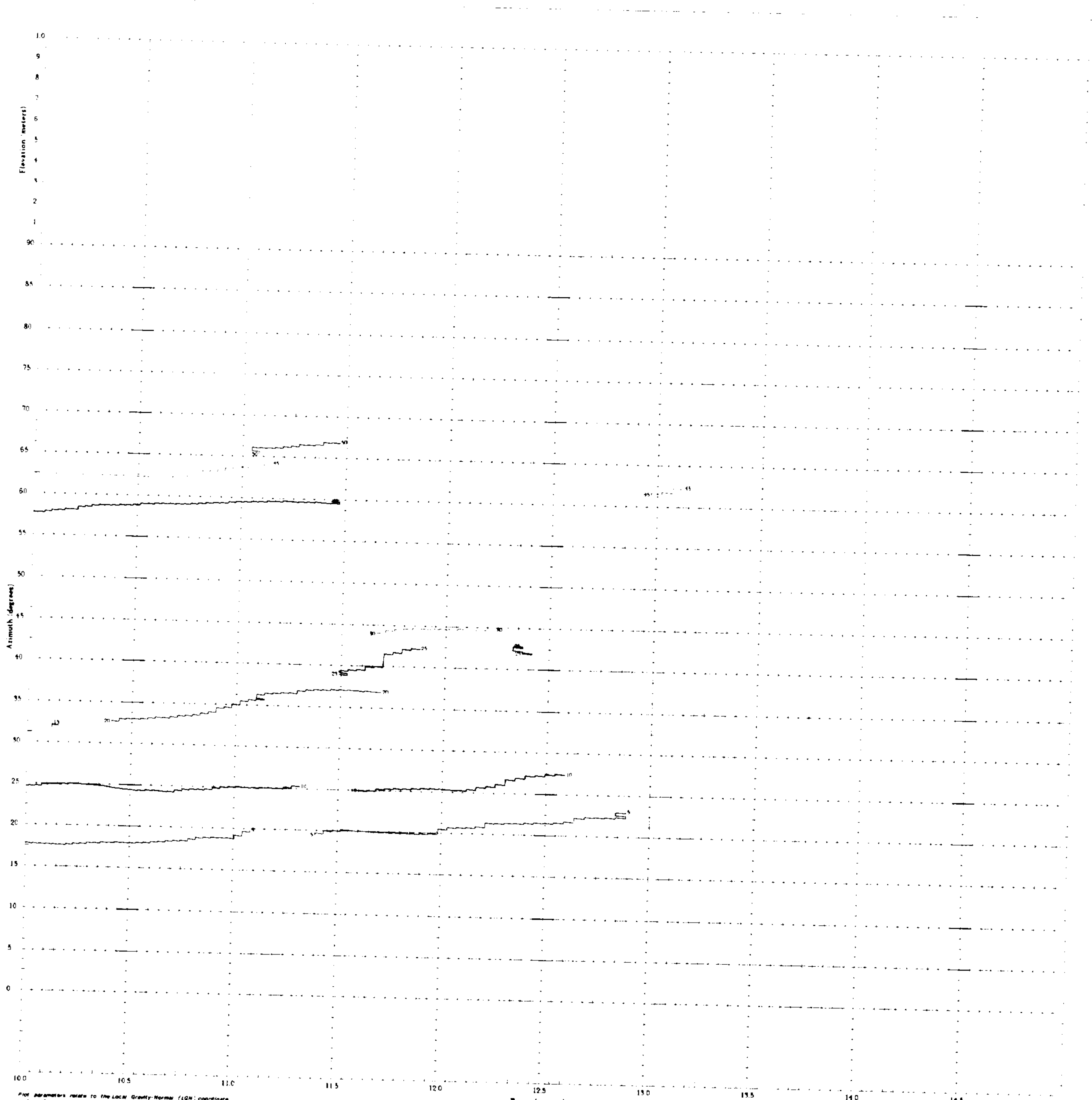


VIKING LANDER 1
SYSTEMATIC VERTICAL PROFILES
SCALE 1 : 10 RANGE 5 TO 10 METERS 0 TO 90 DEGREES

Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

Range Data Set Files	
JPL:	Stanford:
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by J. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955149, and grant NSG 7538
[illegible] APRIL 1980



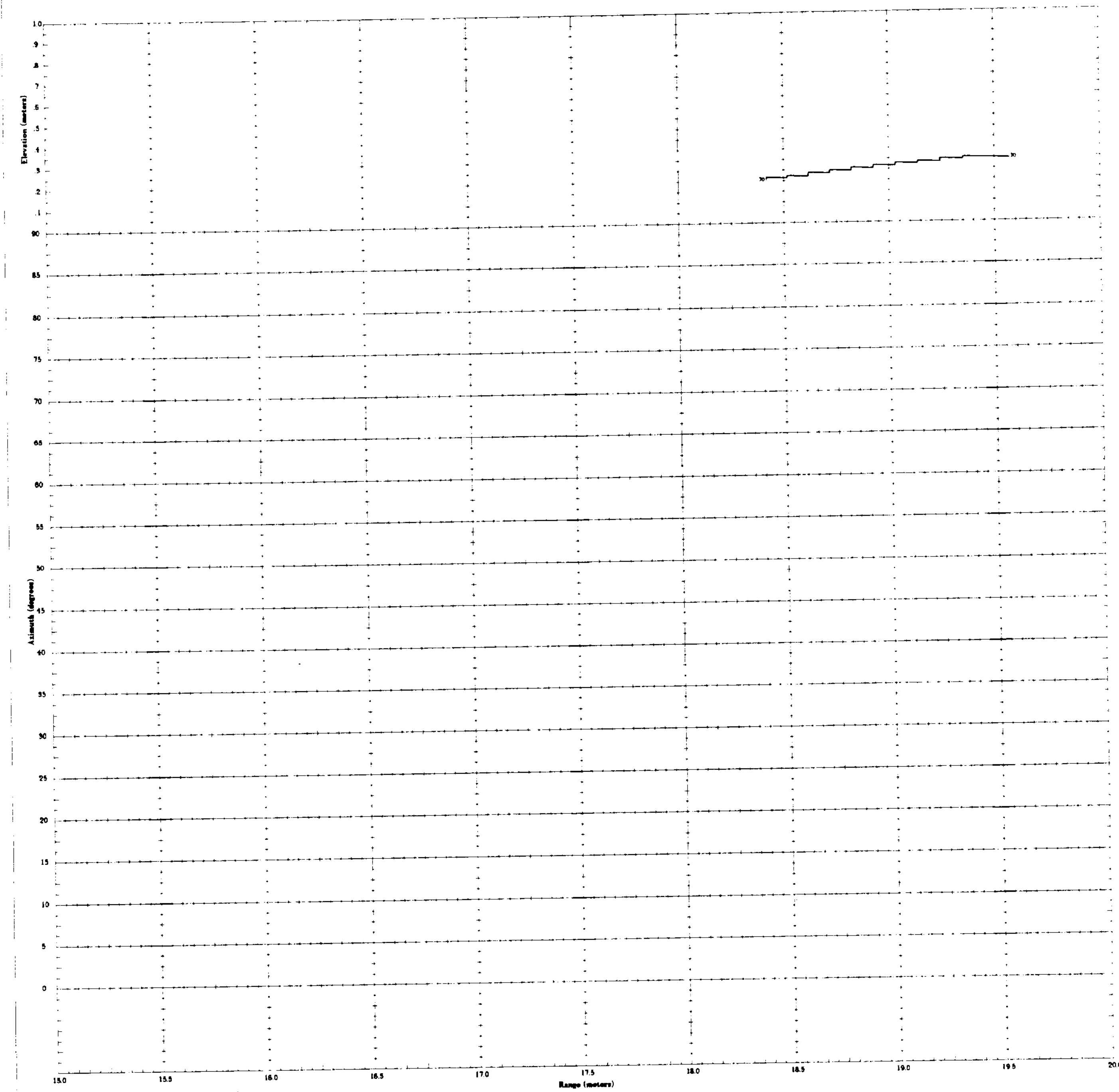
Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The X-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1
SYSTEMATIC VERTICAL PROFILES
SCALE 1 : 10 RANGE 10 TO 15 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 954249, and grant NSG 7318.
APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Y-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

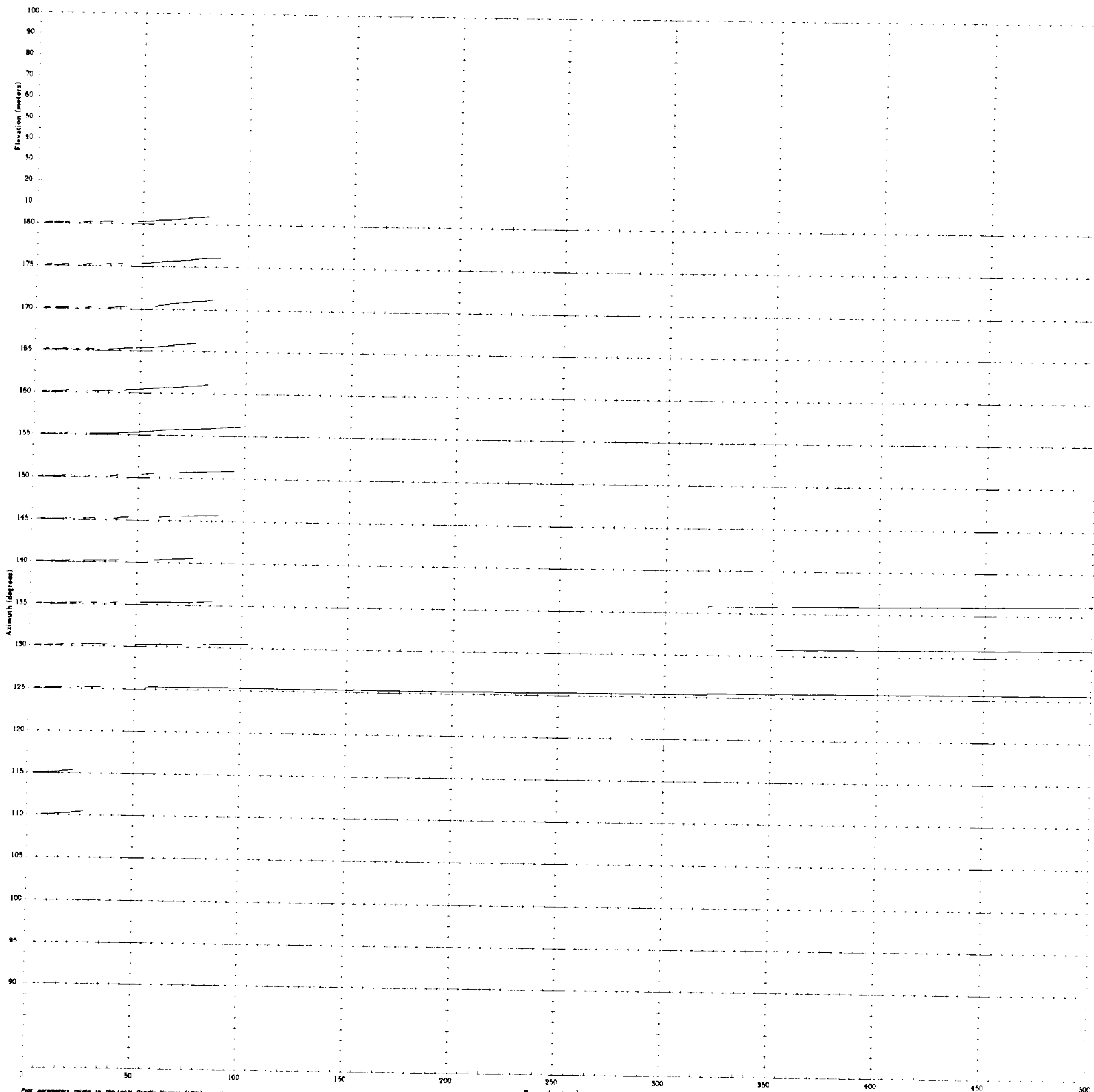
SCALE 1 : 10 RANGE 15 TO 20 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.RDSV.ZOA.FRONT	L1VFA
L1.RDSV.FRONTB	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.ZOR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7198.

APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

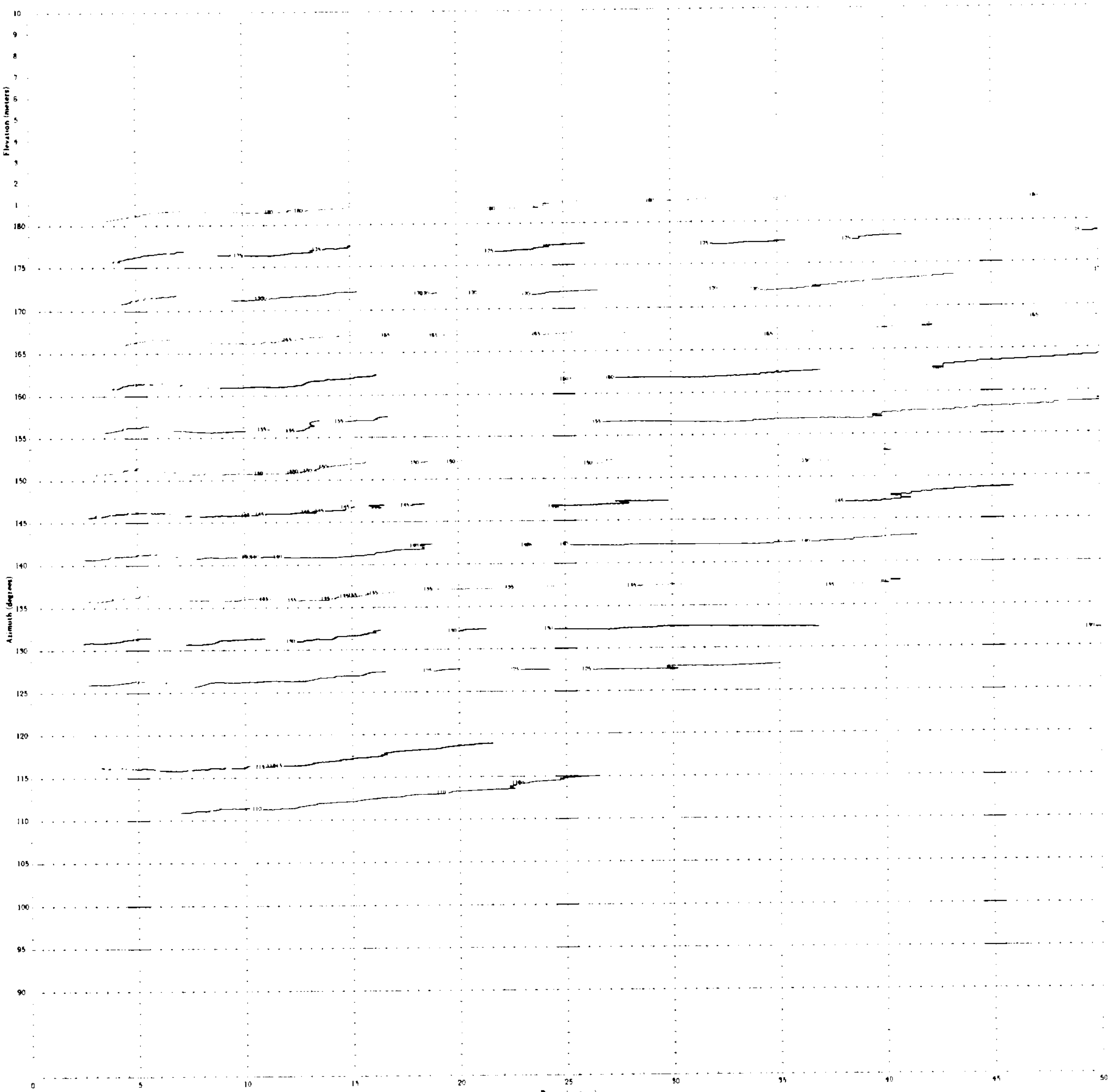
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 1000 RANGE 0 TO 500 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953249, and grant NSG 7538. [illegible] APRIL [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

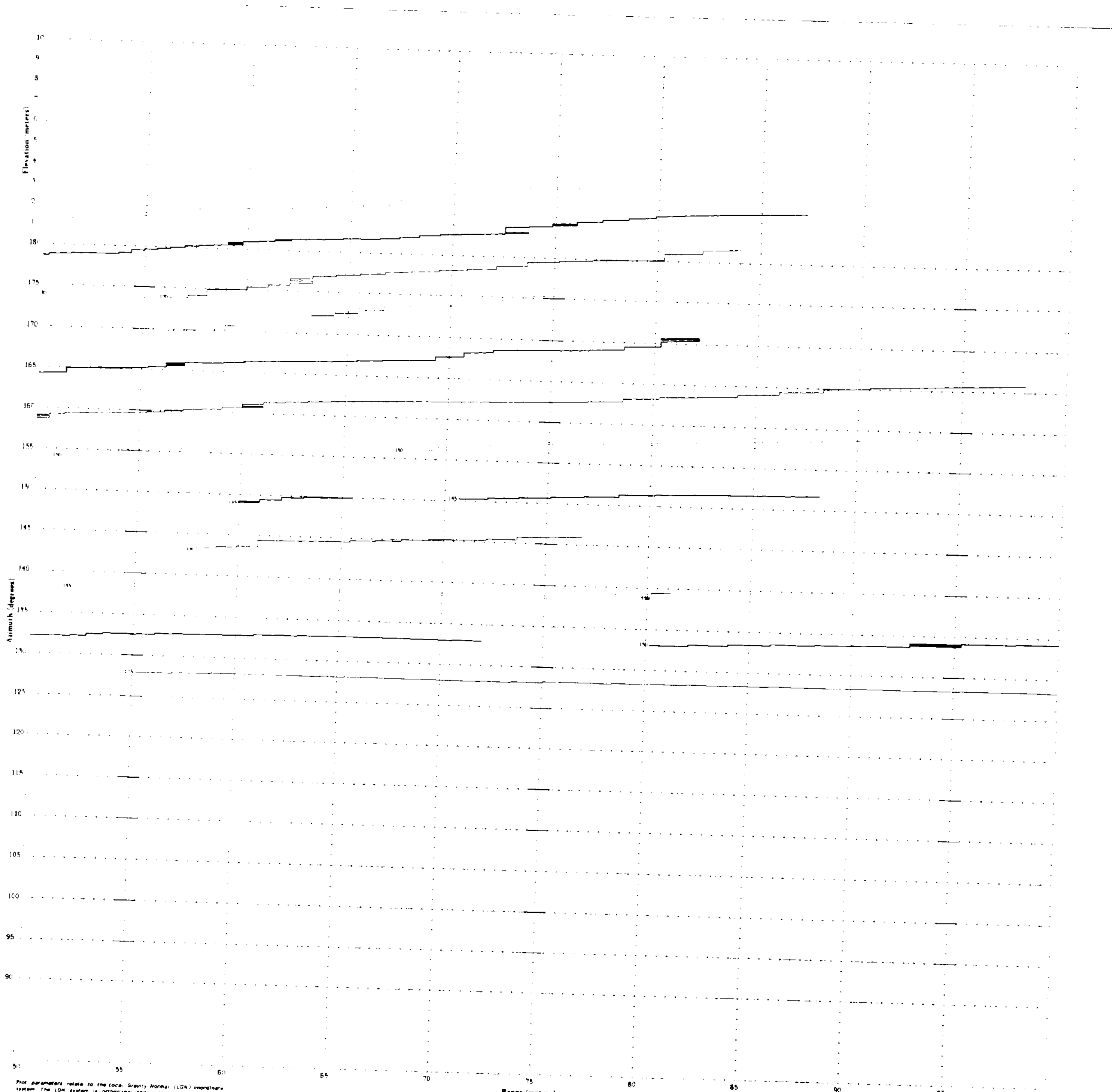
VIKING LANDER 1
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 0 TO 50 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9682 and JPL 955249 and grant NSG 7538. [illegible] APRIL [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The X axis points in the direction of the projection of the LACS X axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

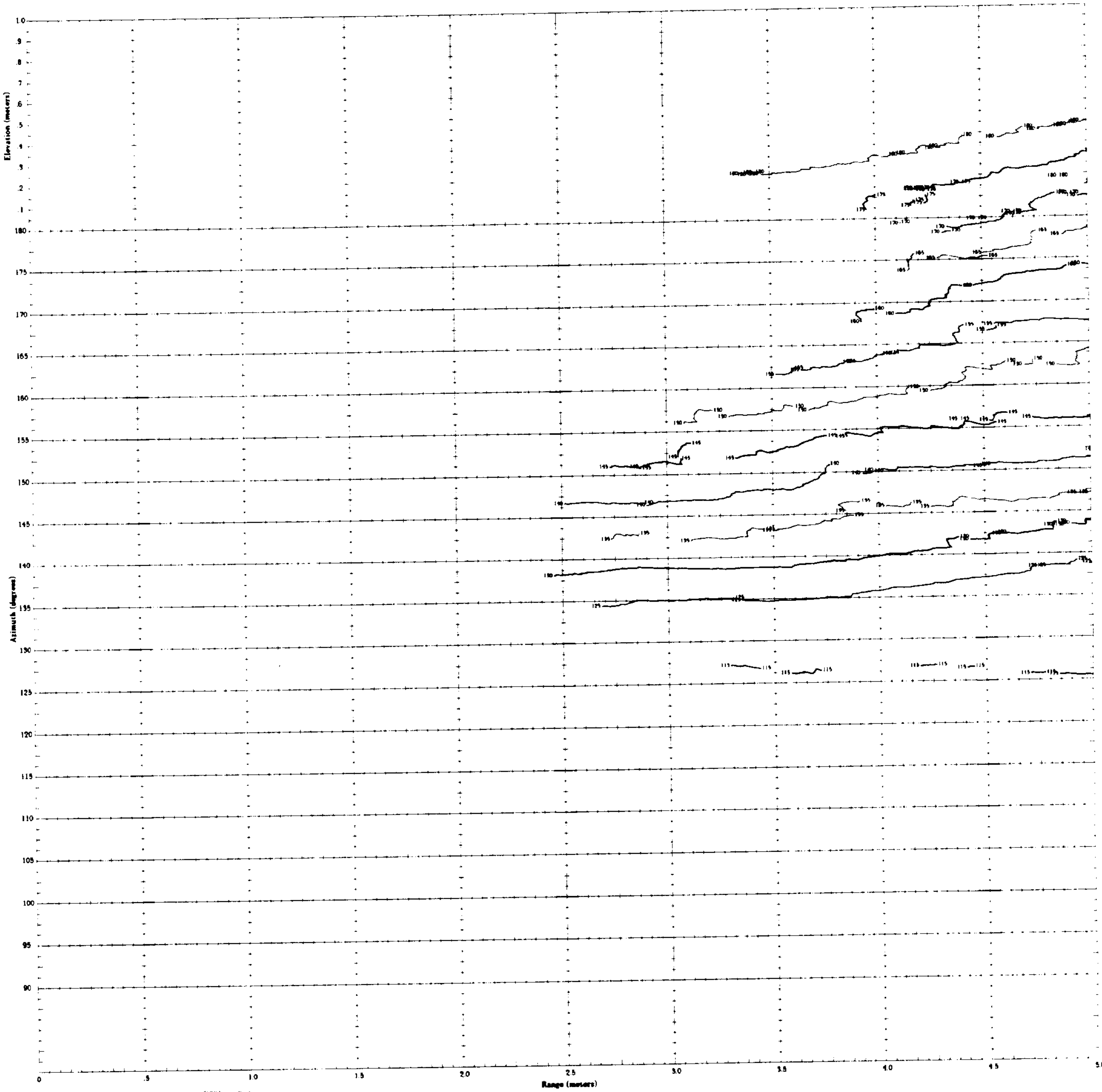
SCALE 1 : 100 RANGE 50 TO 100 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes utilizing resources of the [illegible] Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract [illegible] and JPL [illegible] and grant [illegible]

APRIL [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

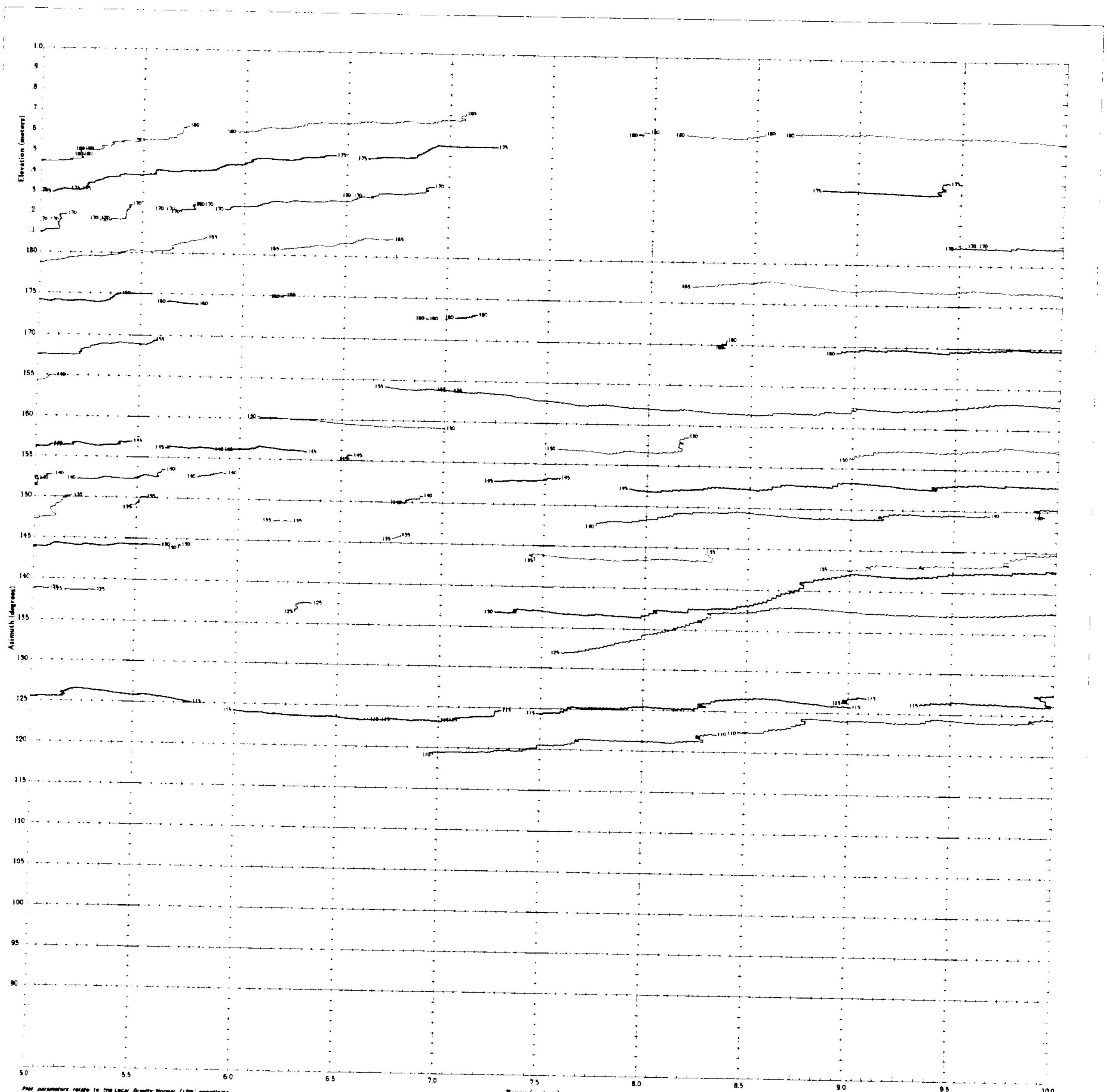
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 0 TO 5 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.ROSV.EDR.FRONT	L1VFA
L1.ROSV.FRONTS	L1VFP
L1.ROSV.BACK	L1VBP
L1.ROSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955349, and grant NSG 7330.
[illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

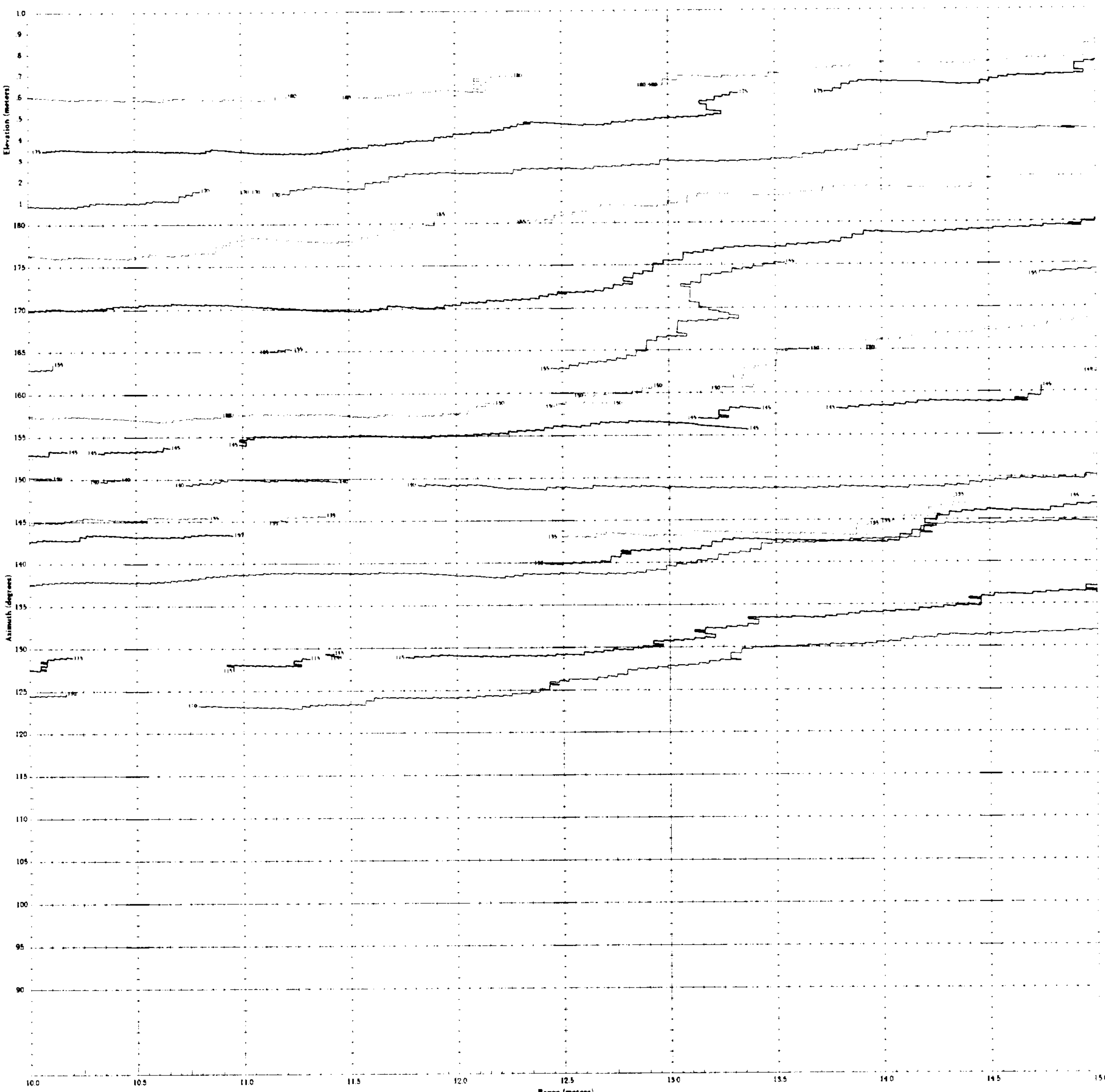
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 5 TO 10 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL.	Stanford.
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing facilities of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955349, and grant NSG 7138 040-000055 APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y axis.

VIKING LANDER 1

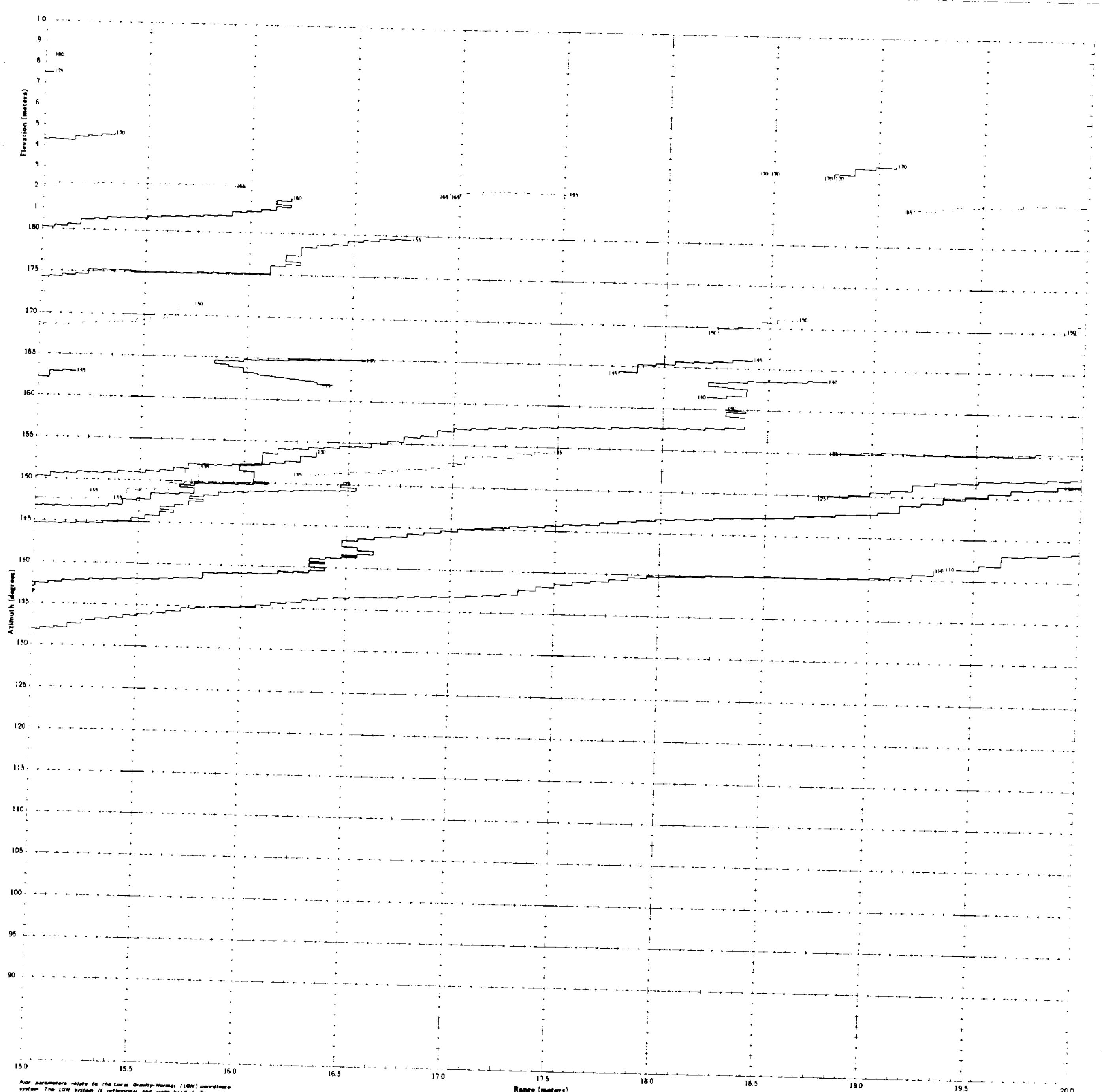
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L1.ADSV.EDR.FRONT	L1VFA
L1.ADSV.FRONTS	L1VFP
L1.ADSV.BACK	L1VBP
L1.ADSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249, and grant NSG 7538.
[illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

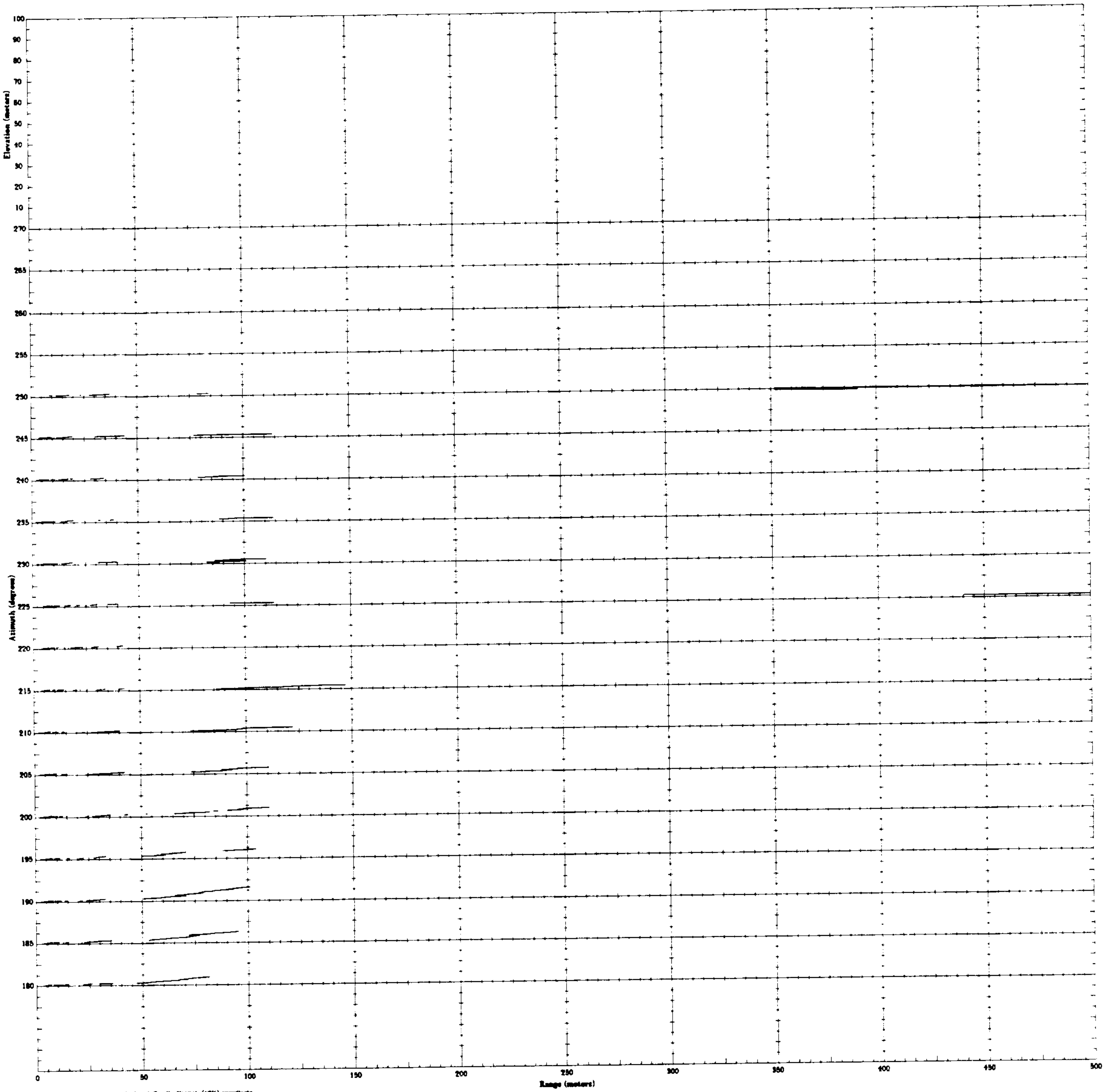
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 15 TO 20 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7149. [illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

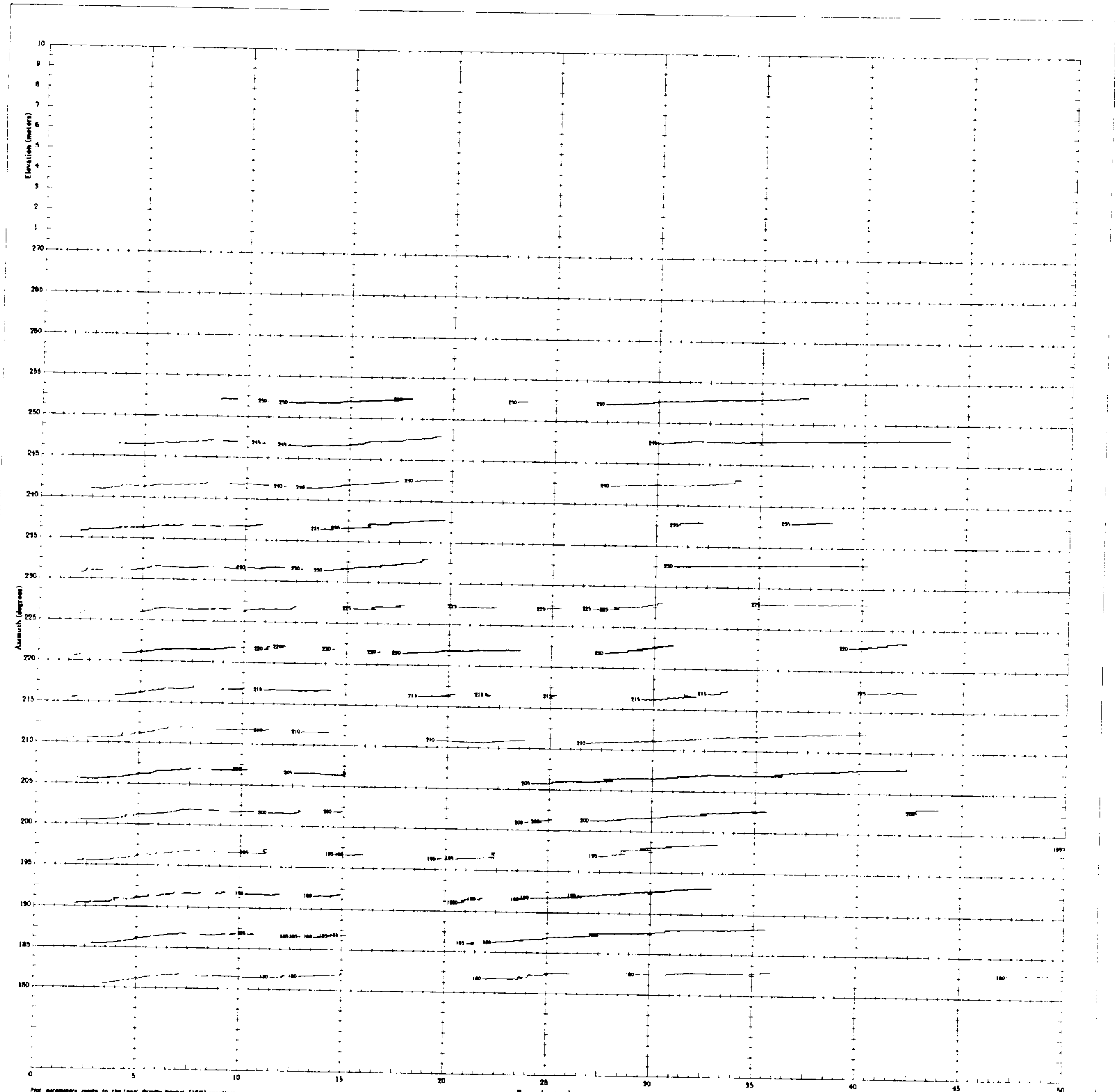
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 1000 RANGE 0 TO 500 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts # AS1-9683 and JPL 955349, and grant # SC 7138
040-[illegible] APRIL 1980



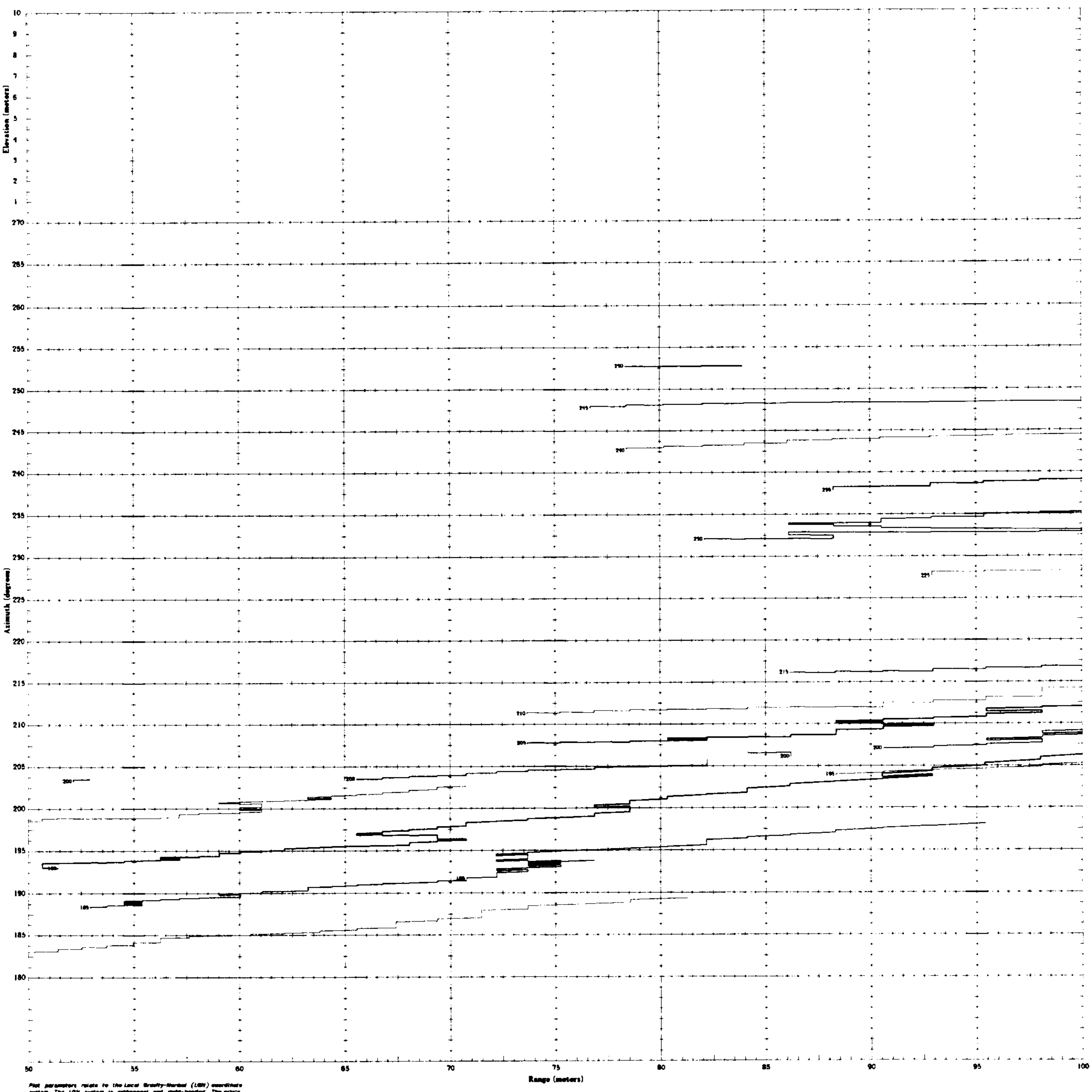
Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS X-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1
SYSTEMATIC VERTICAL PROFILES
SCALE 1 : 100 RANGE 0 TO 50 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.RDSV.ZOR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.ZOR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7234
0404[illegible]/0855 APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

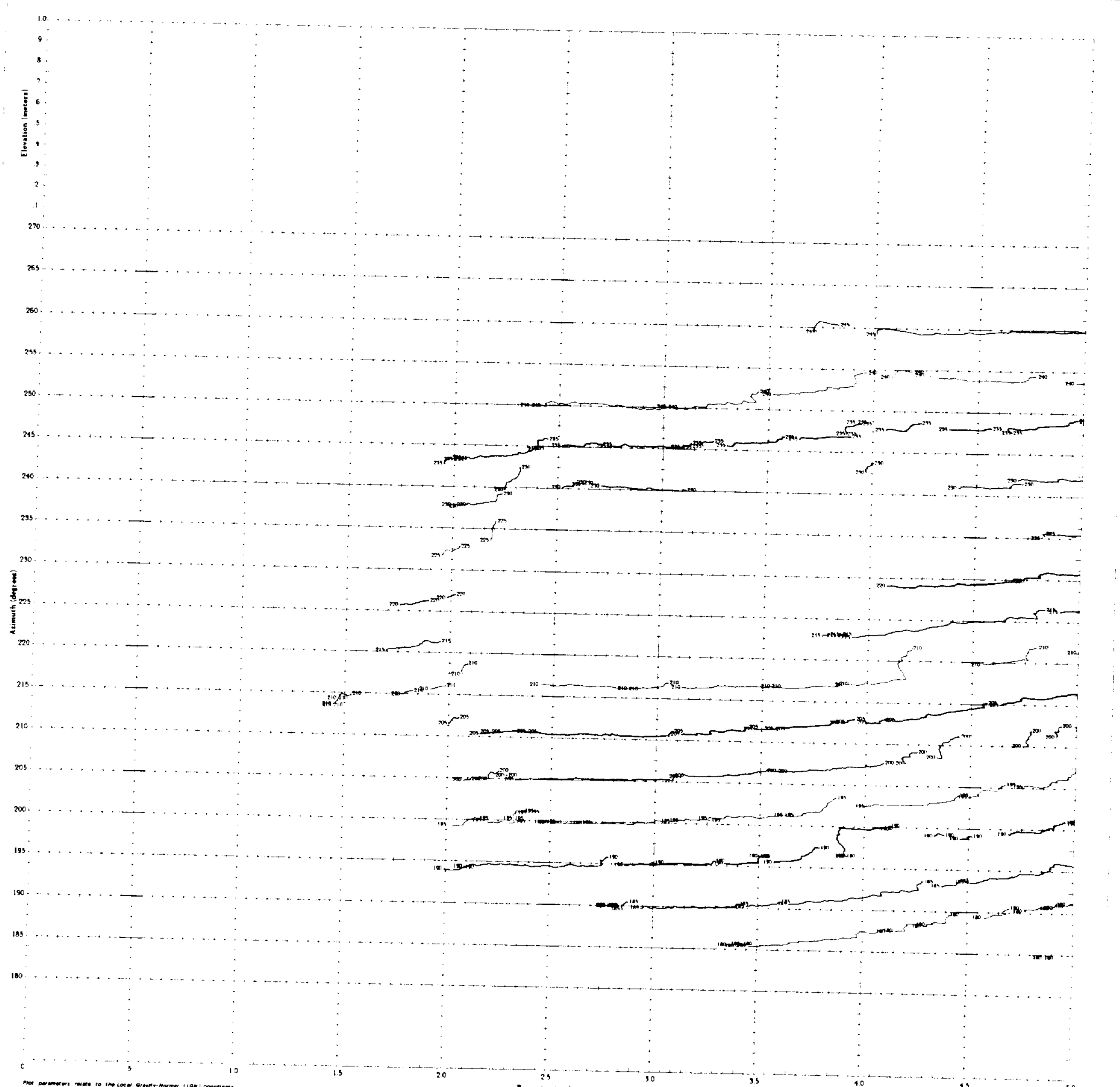
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 50 TO 100 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts N 431-9692 and JPL 955249, and grant NSG 7314
[illegible] APRIL 1980



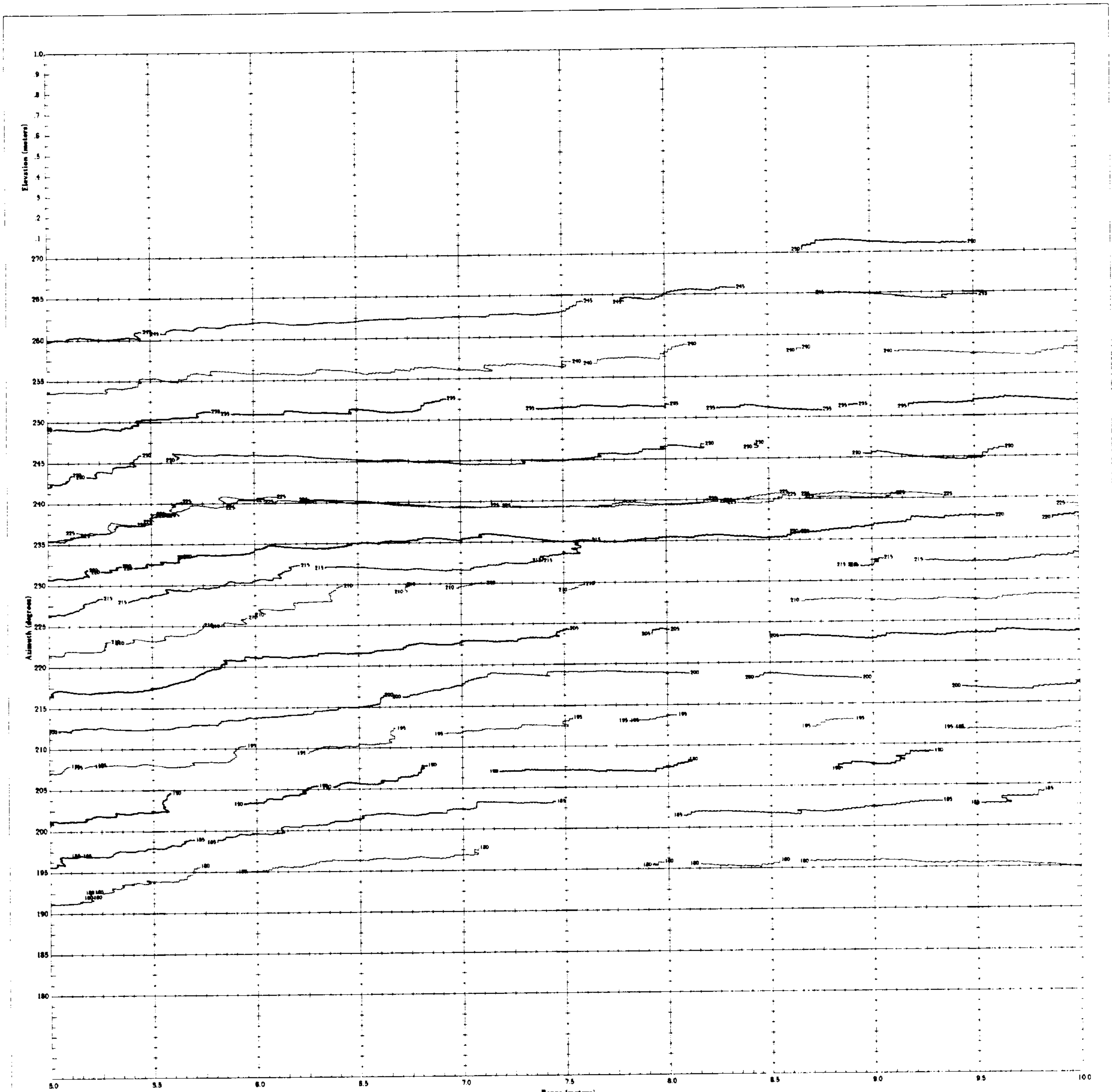
Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1
SYSTEMATIC VERTICAL PROFILES
SCALE 1 : 10 RANGE 0 TO 5 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7136.
[illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS X-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

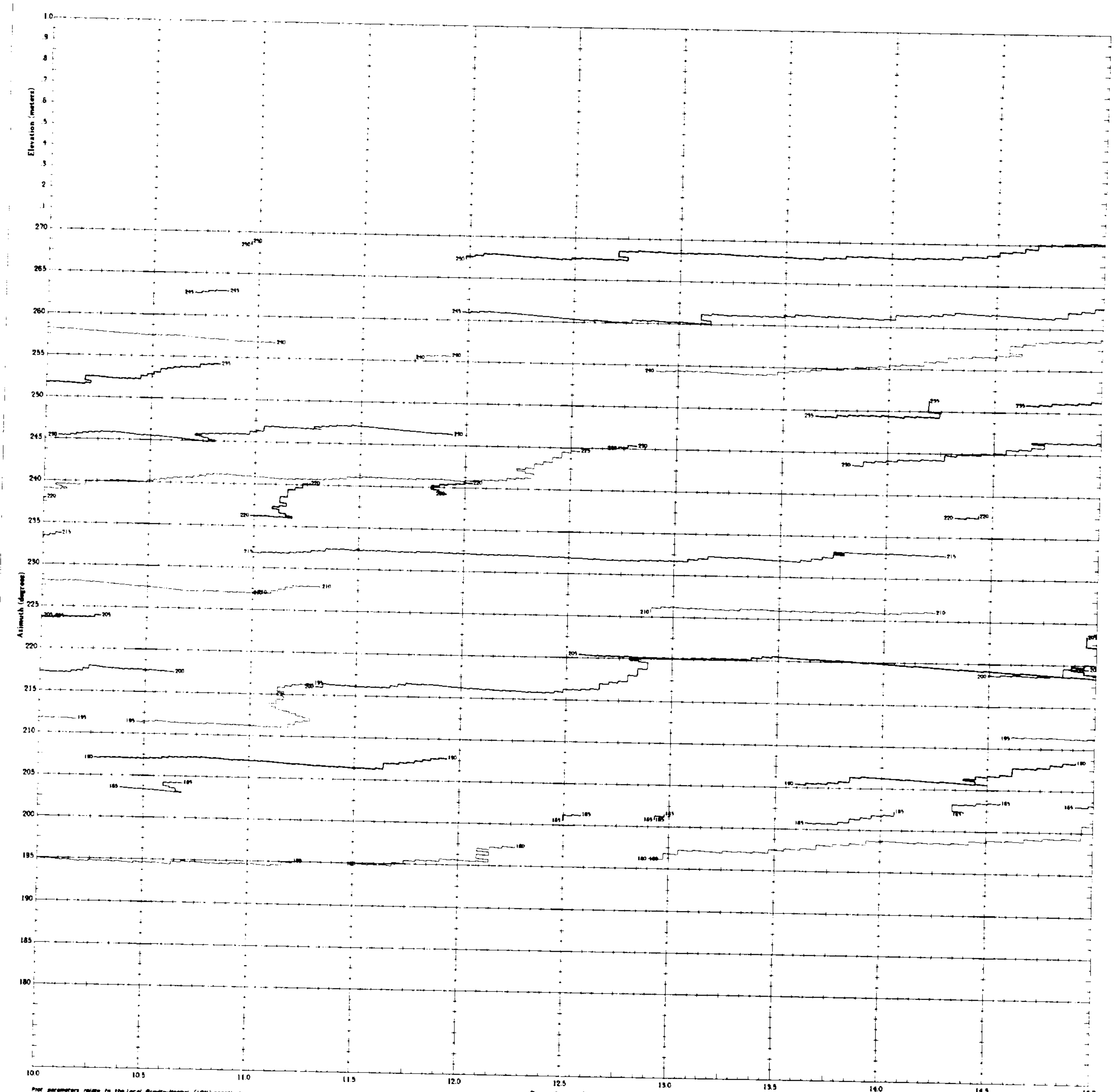
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10   RANGE 5 TO 10 METERS   180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L1.ADSV.EOR.FRONT	L1VFA
L1.ADSV.FRONT3	L1VFP
L1.ADSV.BACK	L1VBP
L1.ADSV.EOR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953799, and grant NSG 7338
[illegible]   APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

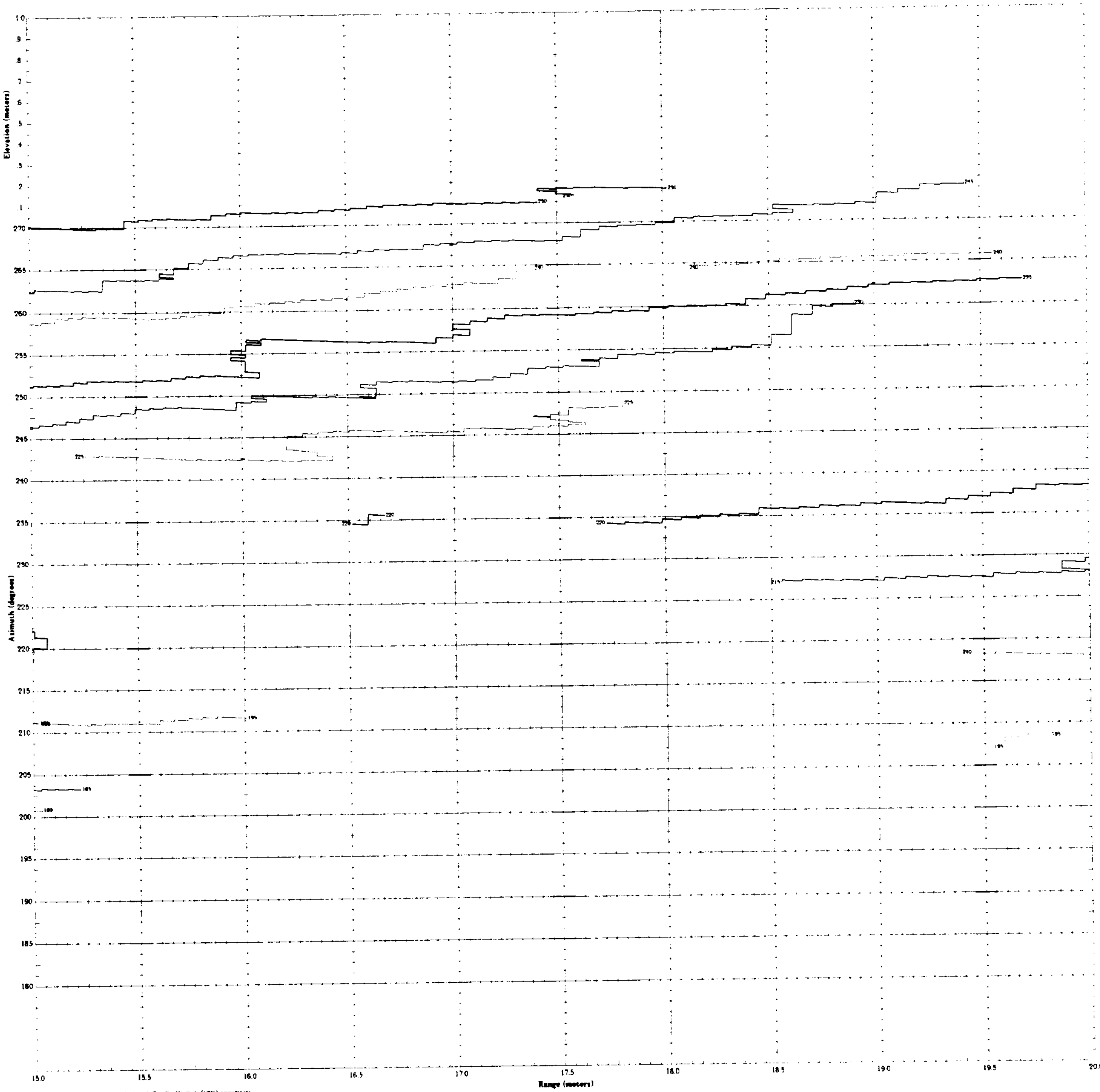
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL:	Stanford:
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7134.
040480/0855 APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

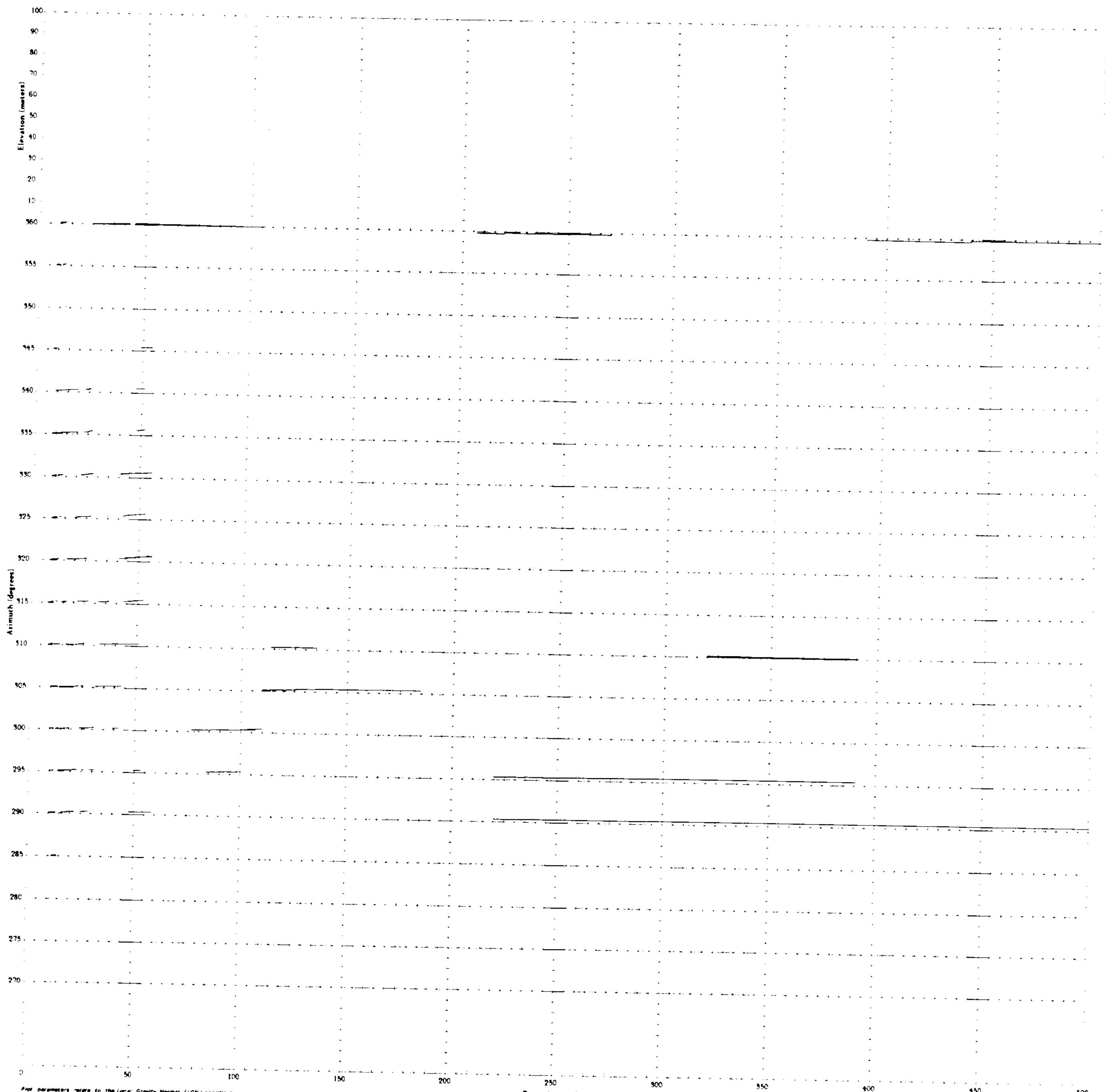
SCALE 1 : 10 RANGE 15 TO 20 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L1.ADSV.EDR.FRONT	L1VFA
L1.ADSV.FRONT3	L1VFP
L1.ADSV.BACK	L1VBP
L1.ADSV.EDR.BACK	L1VBA

These maps were produced by [illegible], utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249 and grant [illegible]

APRIL 1980



Plot parameters relate to the Local Gravity Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

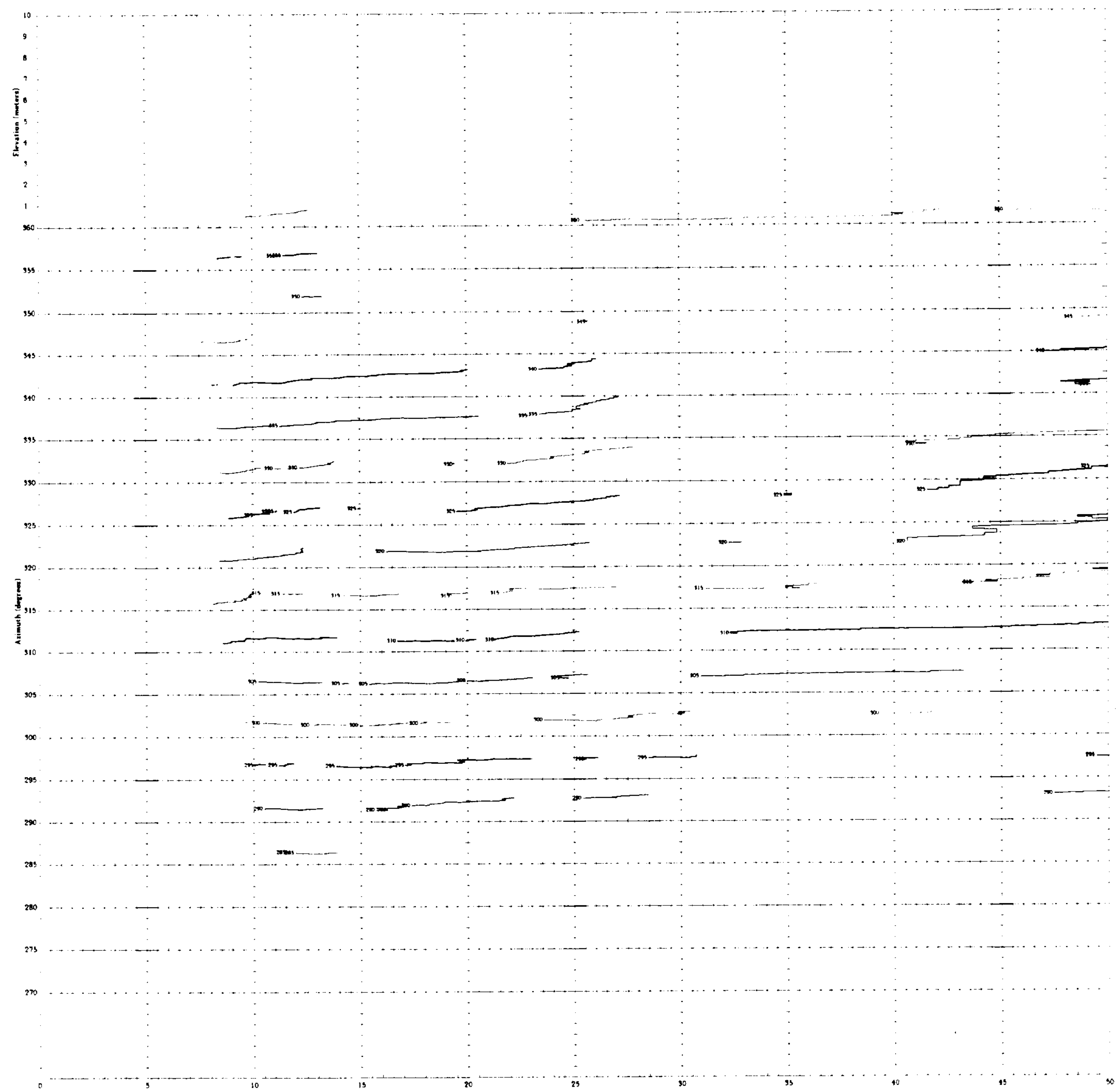
SCALE 1 : 1000 RANGE 0 TO 500 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, [illegible] of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-[illegible] and JPL 955249, and grant NSG 7318 [illegible]

APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

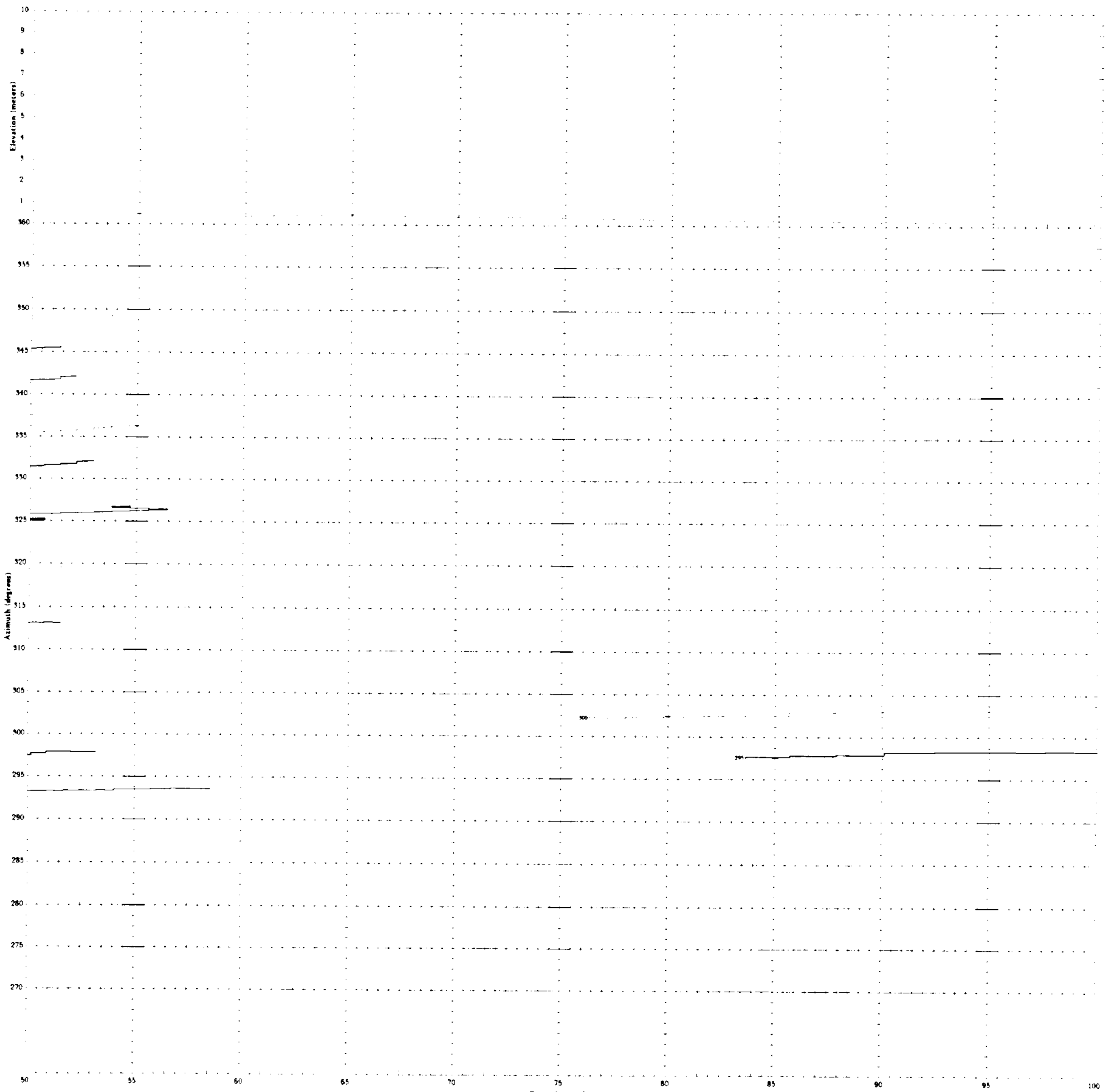
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 0 TO 50 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.ADSV.EDR.FRONT	L1VFA
L1.ADSV.FRONT3	L1VFP
L1.ADSV.BACK	L1VBP
L1.ADSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base produced at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7338.
[illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The X-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

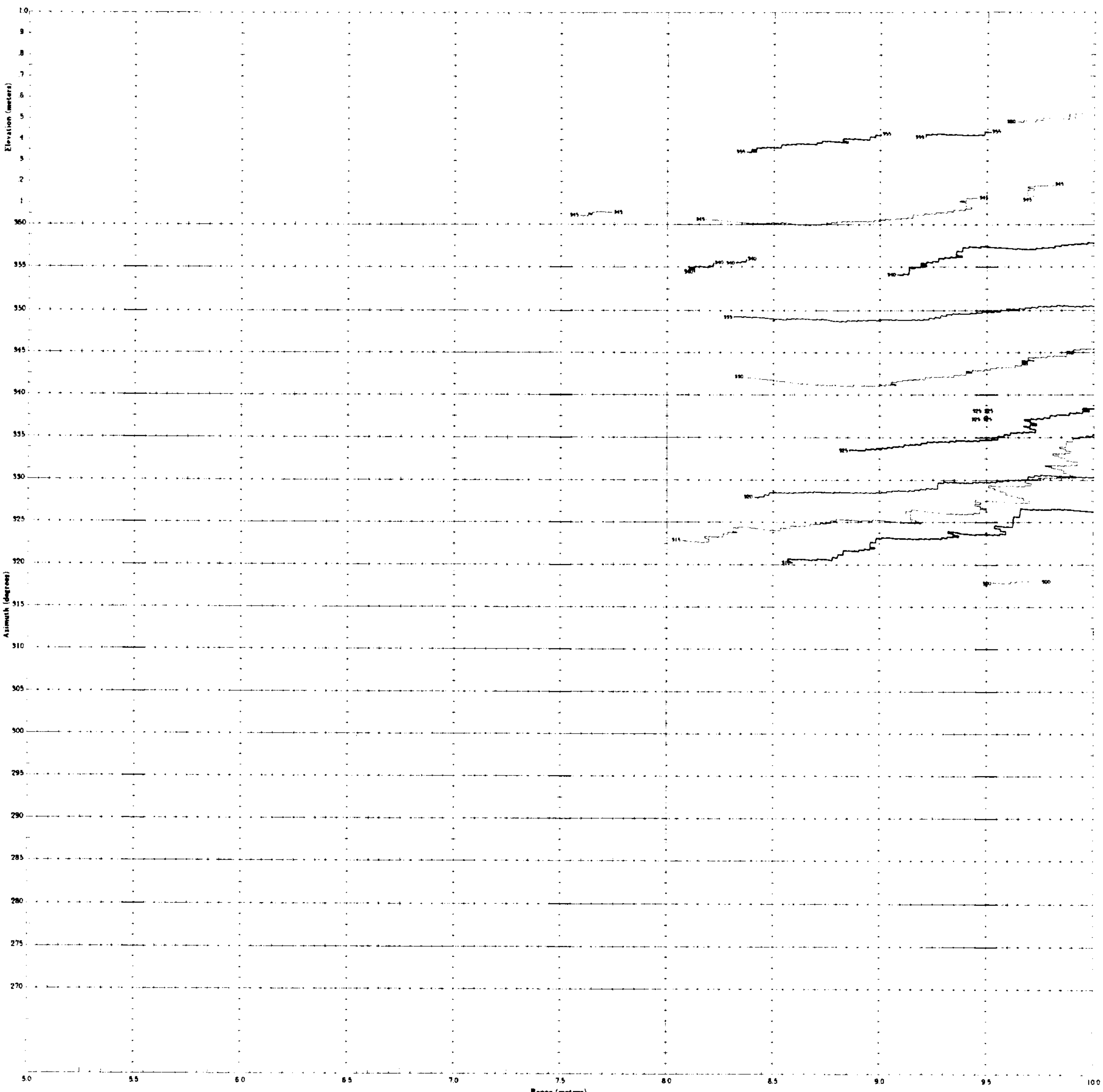
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 50 TO 100 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONT3	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by [illegible], utilizing resources of the [illegible] Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract [illegible] and JPL 955249, and grant [illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

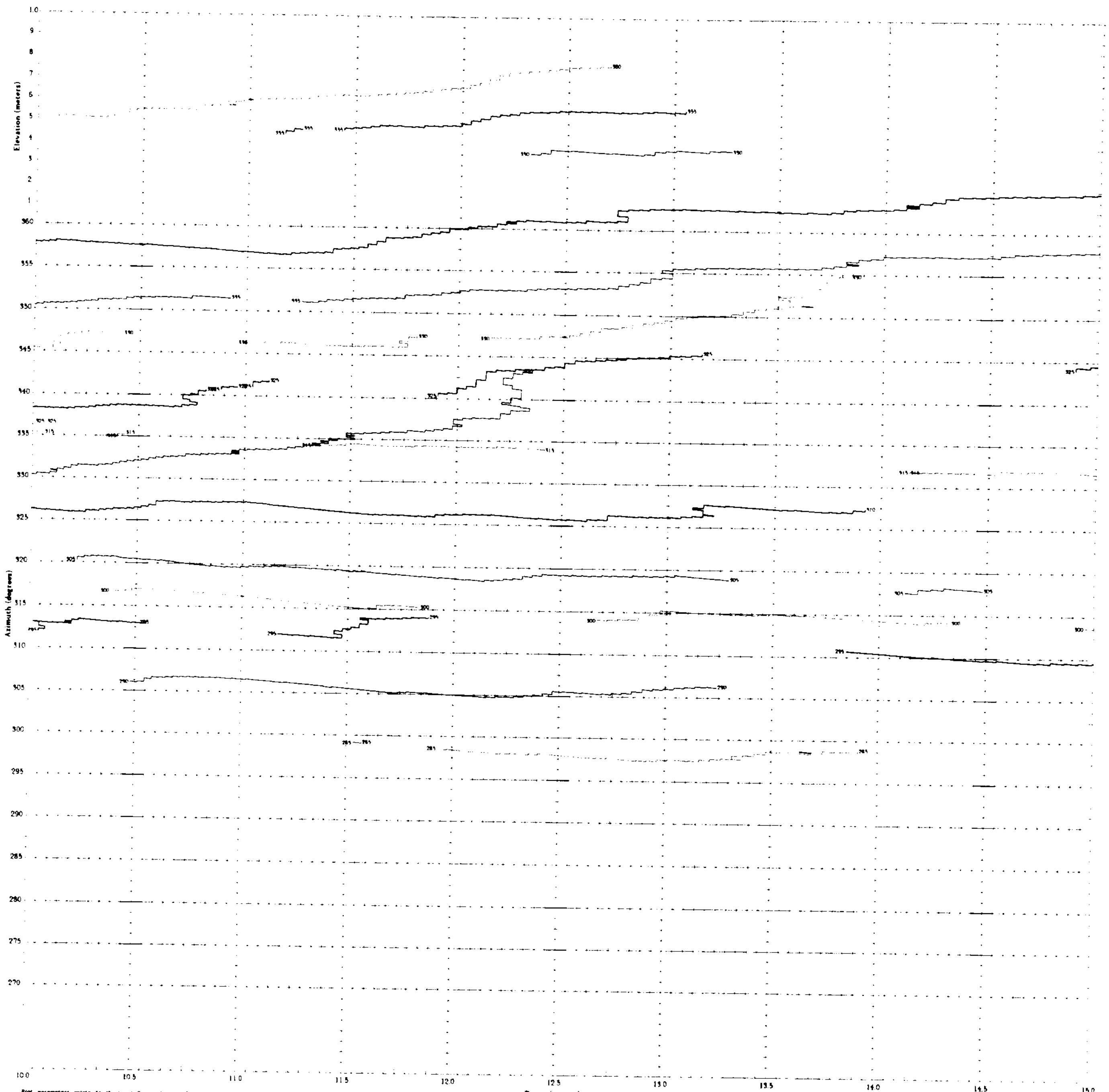
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 5 TO 10 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.ADSV.EOR.FRONT	L1VFA
L1.ADSV.FRONT3	L1VFP
L1.ADSV.BACK	L1VBP
L1.ADSV.EOR.BACK	L1VBA

These maps were produced by [illegible], utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953249, and grant NSG 7538. [illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

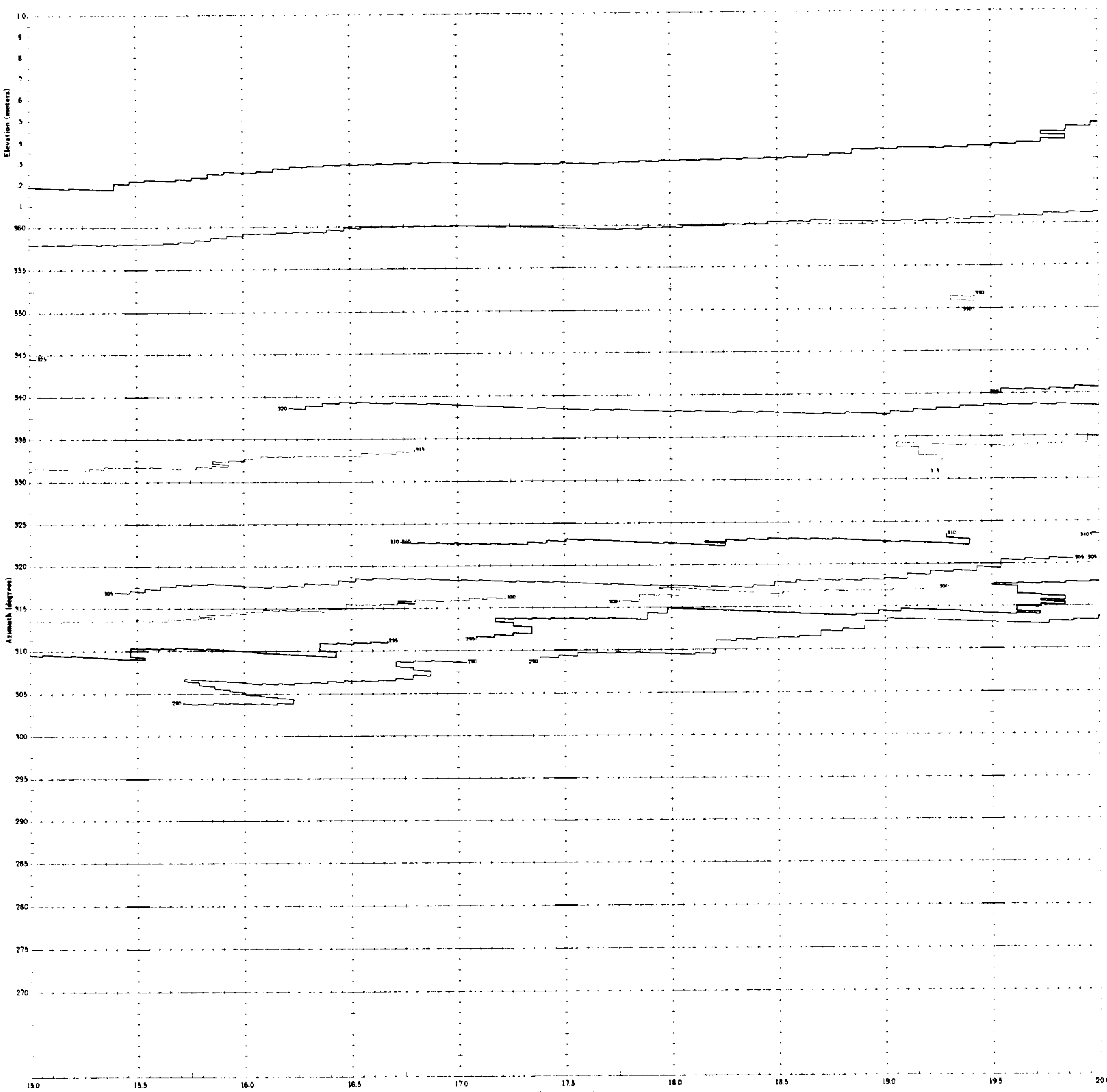
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.RDSV.EDR.FRONT	L1VFA
L1.RDSV.FRONTS	L1VFP
L1.RDSV.BACK	L1VBP
L1.RDSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9687 and JPL 955249, and grant NSF 2338 [illegible] APRIL 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 1

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 15 TO 20 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L1.ROSV.EDR.FRONT	L1VFA
L1.ROSV.FRONTS	L1VFP
L1.ROSV.BACK	L1VBP
L1.ROSV.EDR.BACK	L1VBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9697 and JPL 955749, and grant NSG 7318.
APRIL 1980

6. ELEVATION CONTOURS

6.1 Elevation Contour Mosaic Overlay Stereo Pairs

This section contains mosaic stereo pairs of images into which have been overlayed the systematic elevation contour lines. The general remarks of section 4.1 apply.

Fig. 35. Elevation Contour Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/10/11/055137.

Fig. 36. Elevation Contour Overlay Mosaic: Camera 2 (right), front left quadrant — from IPL PIC ID 79/03/15/022628.

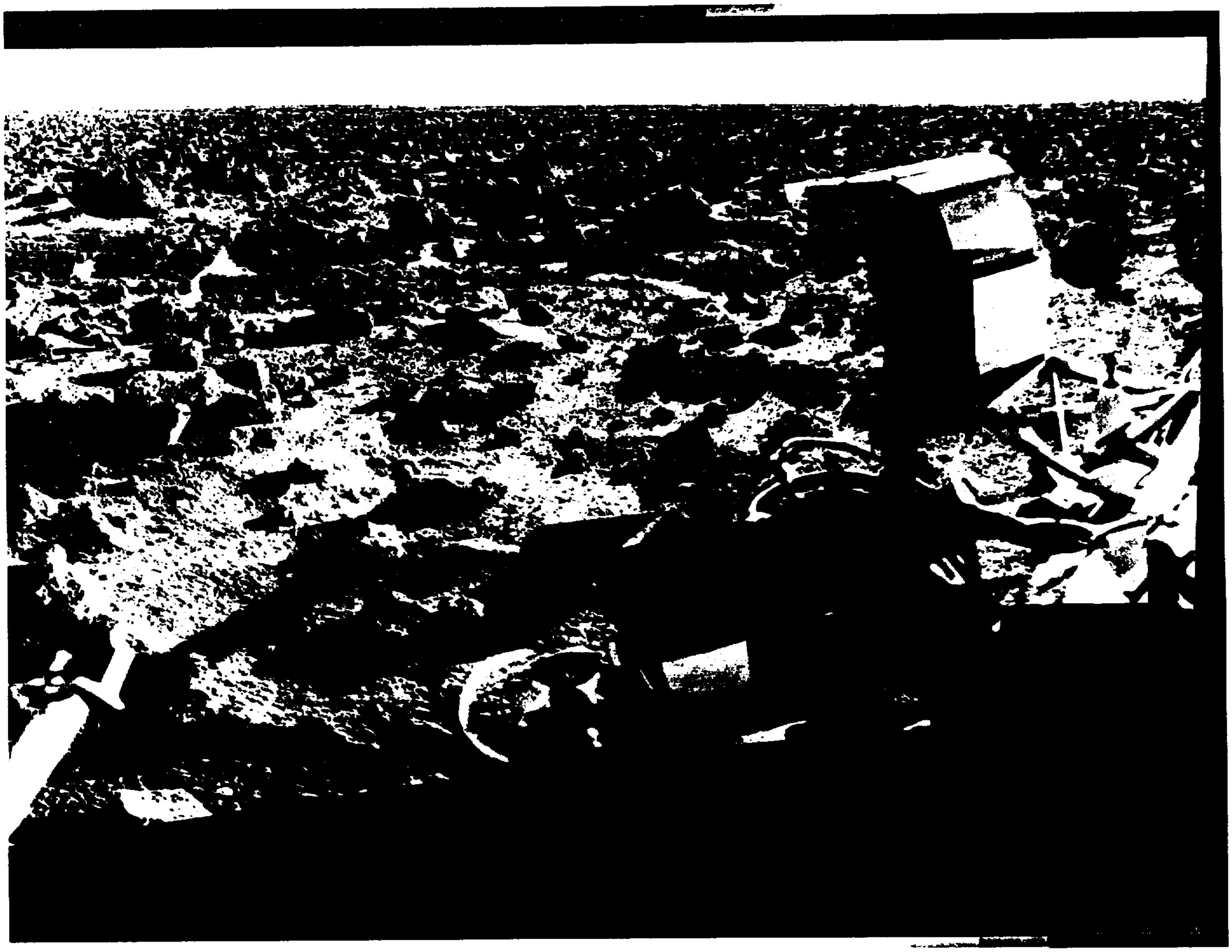


Fig. 37. Elevation Contour Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/10/11/055137.

Fig. 38. Elevation Contour Overlay Mosaic: Camera 2 (right), front right quadrant — from IPL PIC ID 79/03/15/022628.

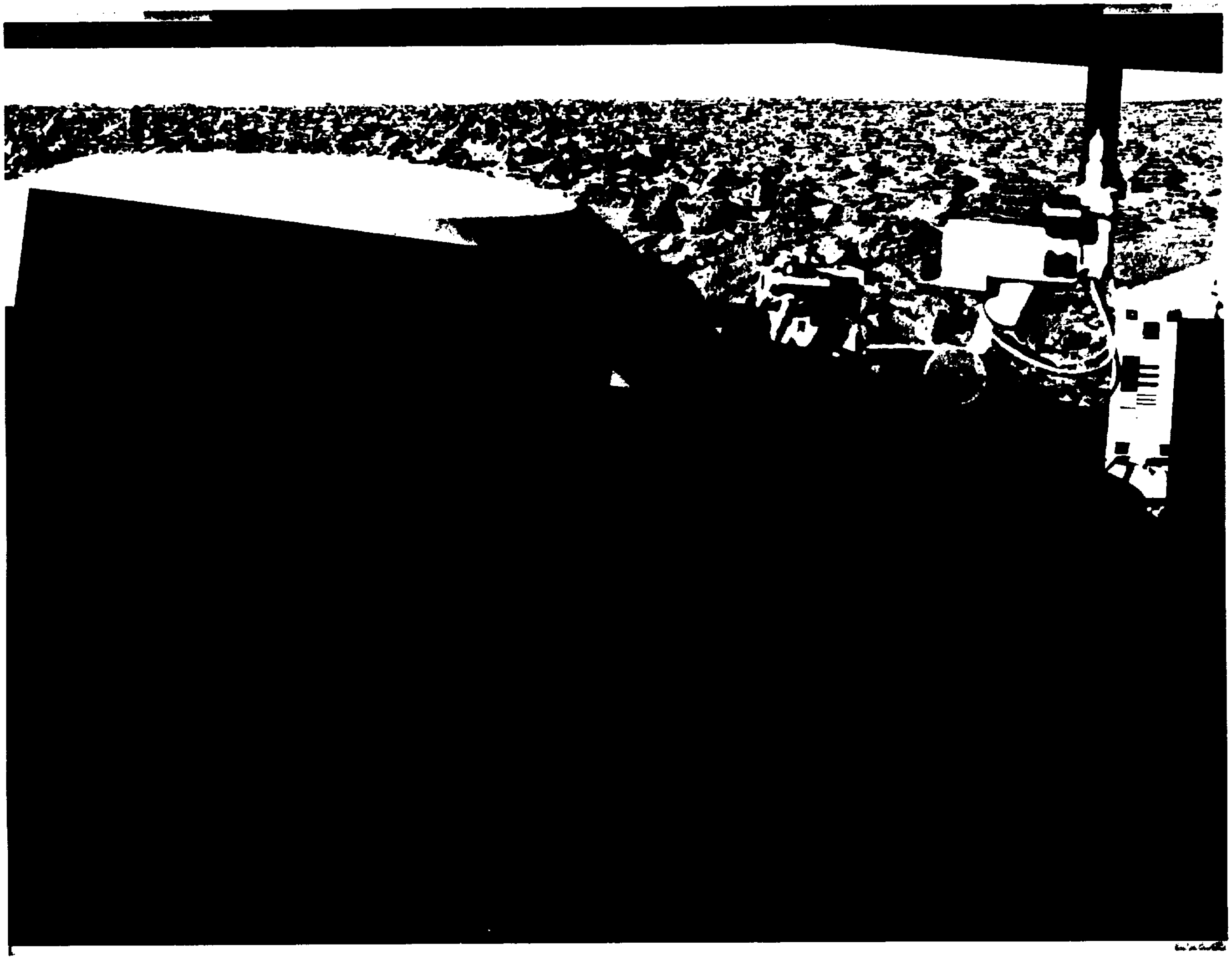


Fig. 39. Elevation Contour Overlay Mosaic: Camera 2 (left), back left quadrant — from IPL PIC ID 79/10/08/233417.

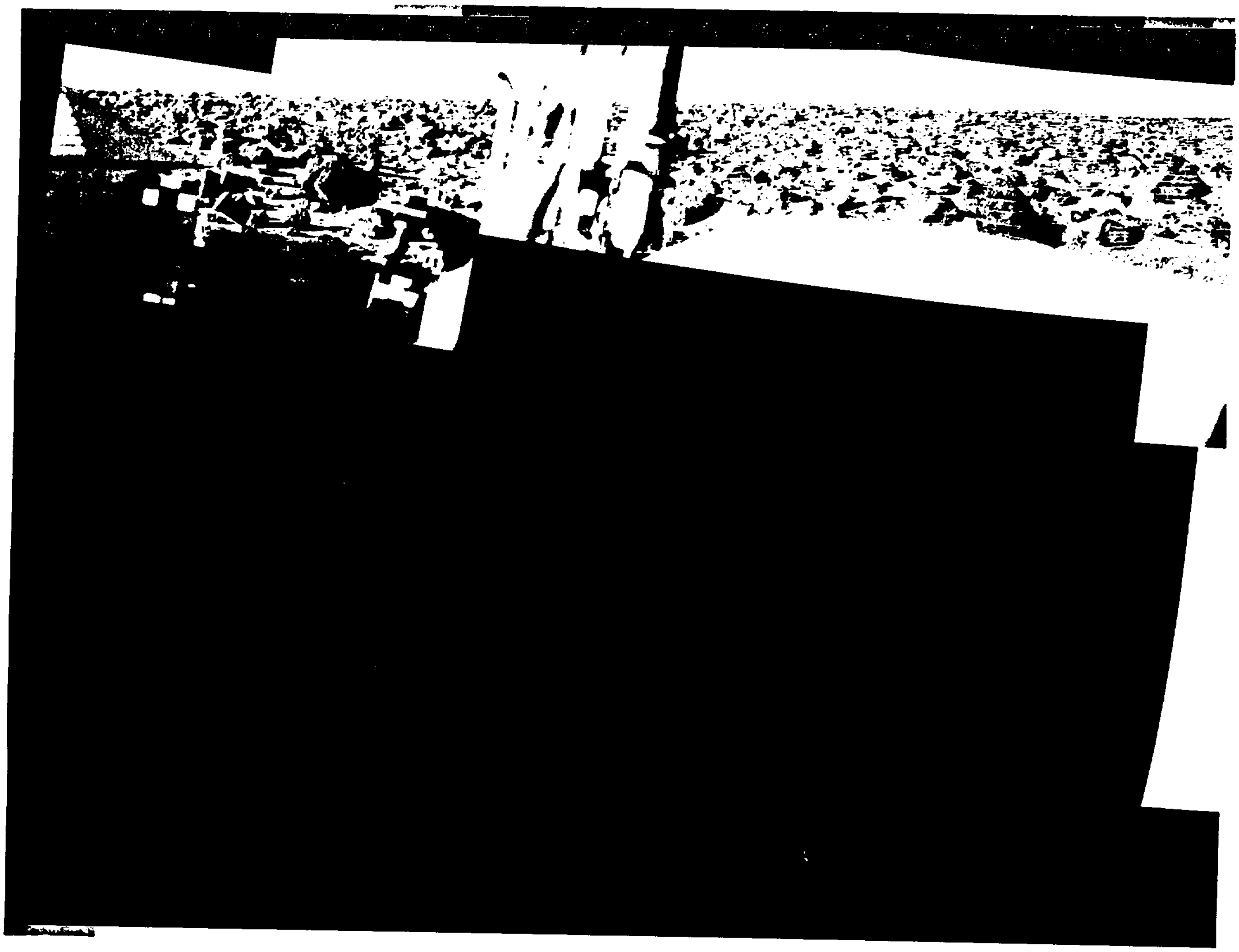


Fig. 40. Elevation Contour Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/04/04/030319.

Fig. 41. Elevation Contour Overlay Mosaic: Camera 2 (left), back right quadrant — from IPL PIC ID 79/10/08/233417.

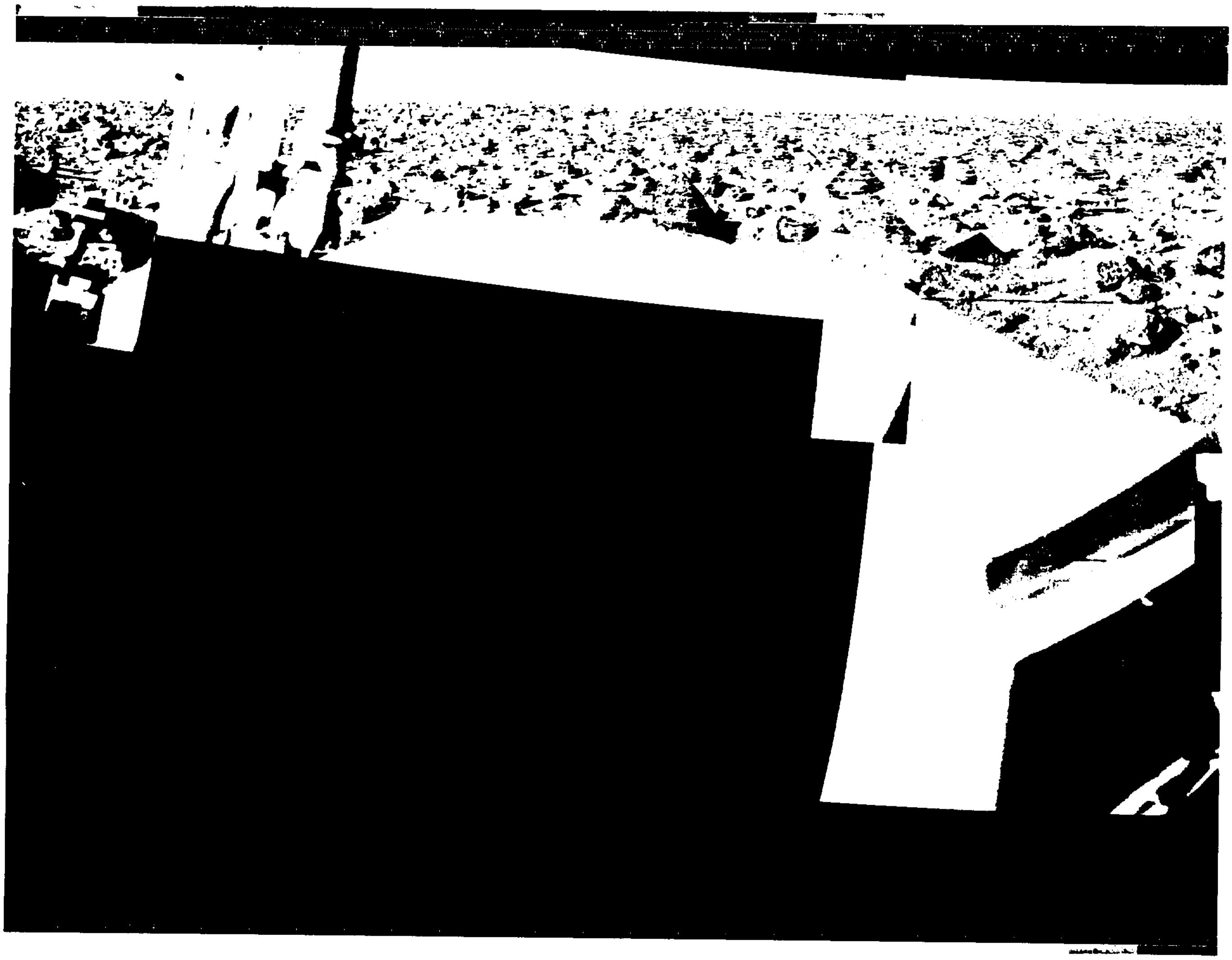


Fig. 42. Elevation Contour Overlay Mosaic: Camera 1 (right), back right quadrant -- from IPL PIC ID 79/04/04/030319.

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6.2 Camera Perspective Annotated Elevation Contours — Camera 1

This section contains camera-1 perspective representations of the elevation contour map data. The nature and purpose of these representations has been explained in section 3.2.1. On opposing pages are presented mosaic overlays of the elevation contour lines, and corresponding camera perspective representations of the map data, with the individual lines of the map data annotated with elevation values. The general discussion of section 4.1 applies to the mosaics of this section.

Fig. 43. Elevation Contour Overlay Mosaic: Camera 1 (left), front left quadrant – from JPL PIC ID 79/10/11/055137.

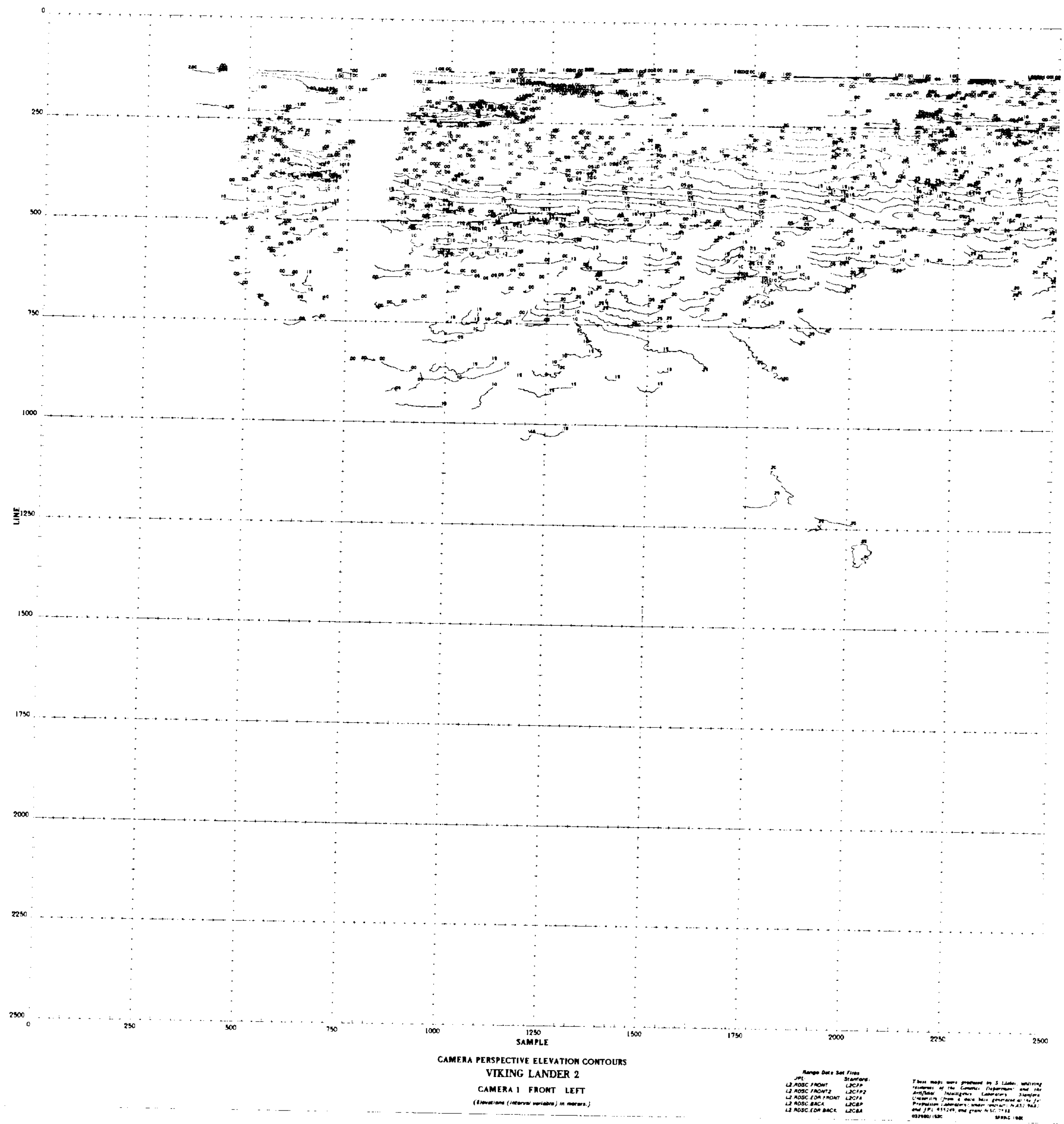


Fig. 44. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), front left quadrant.

Fig. 45. Elevation Contour Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/10/11/055137.

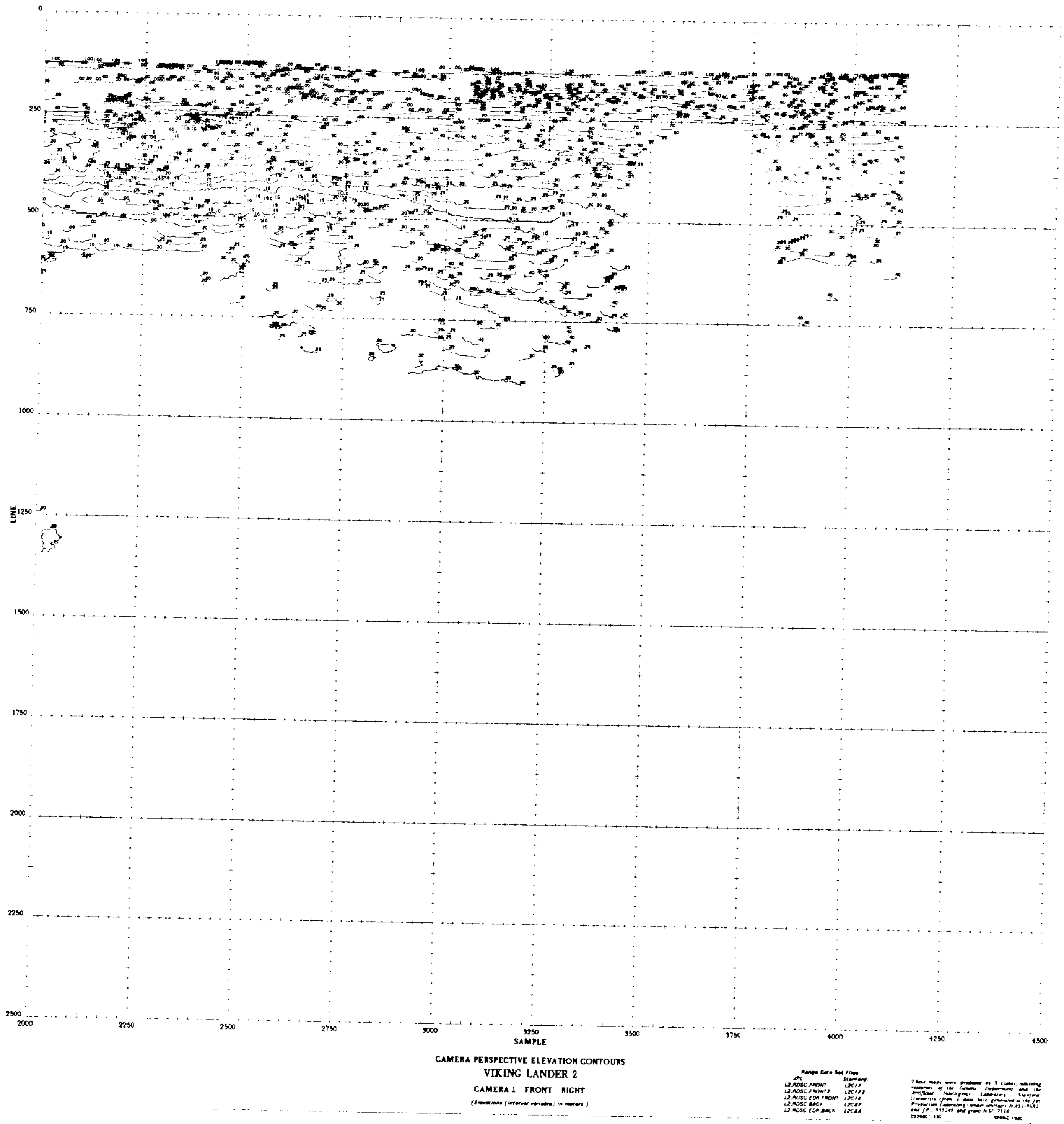


Fig. 46. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), front right quadrant.

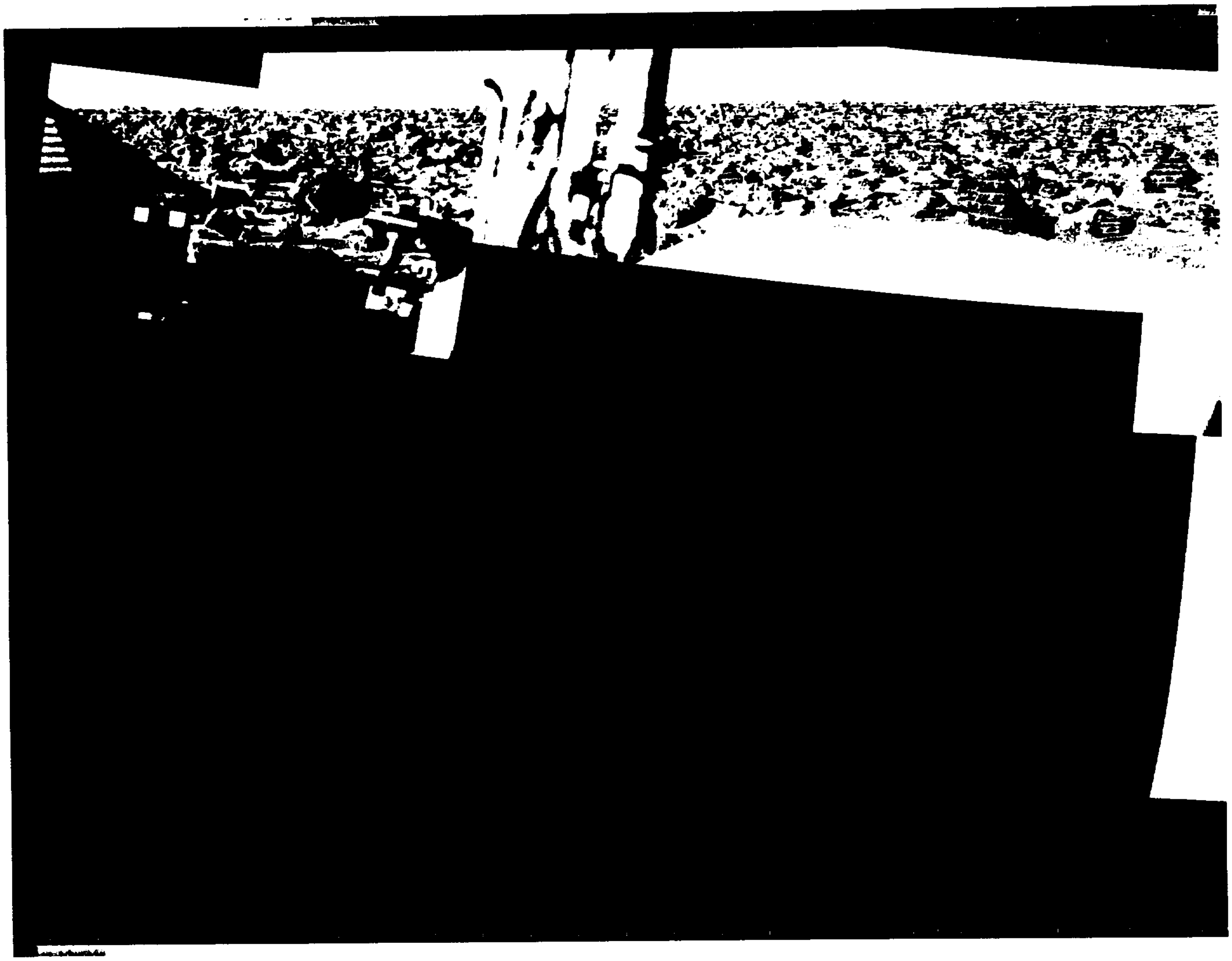


Fig. 47. Elevation Contour Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/04/04/030319.

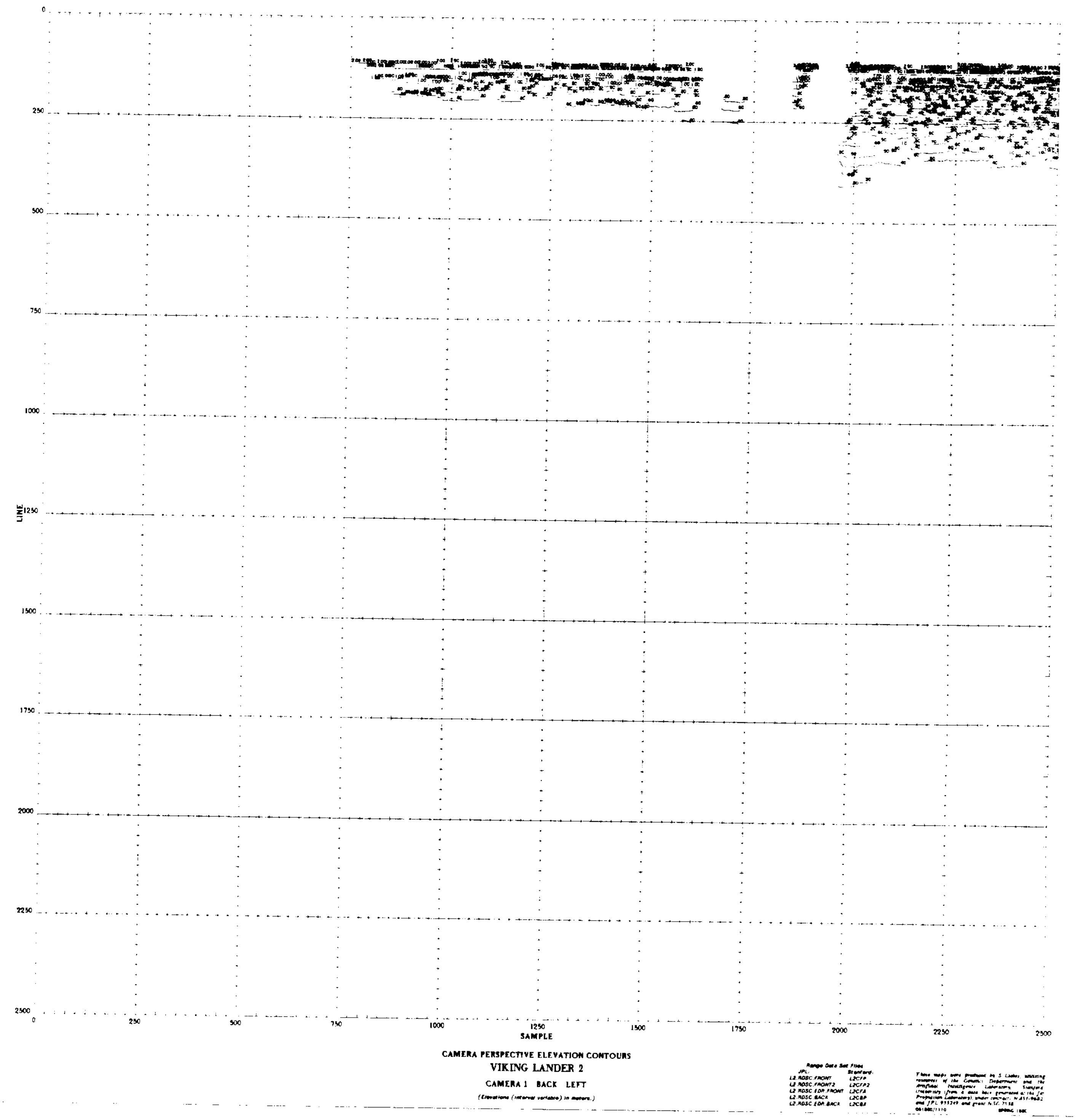


Fig. 48. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), back left quadrant.

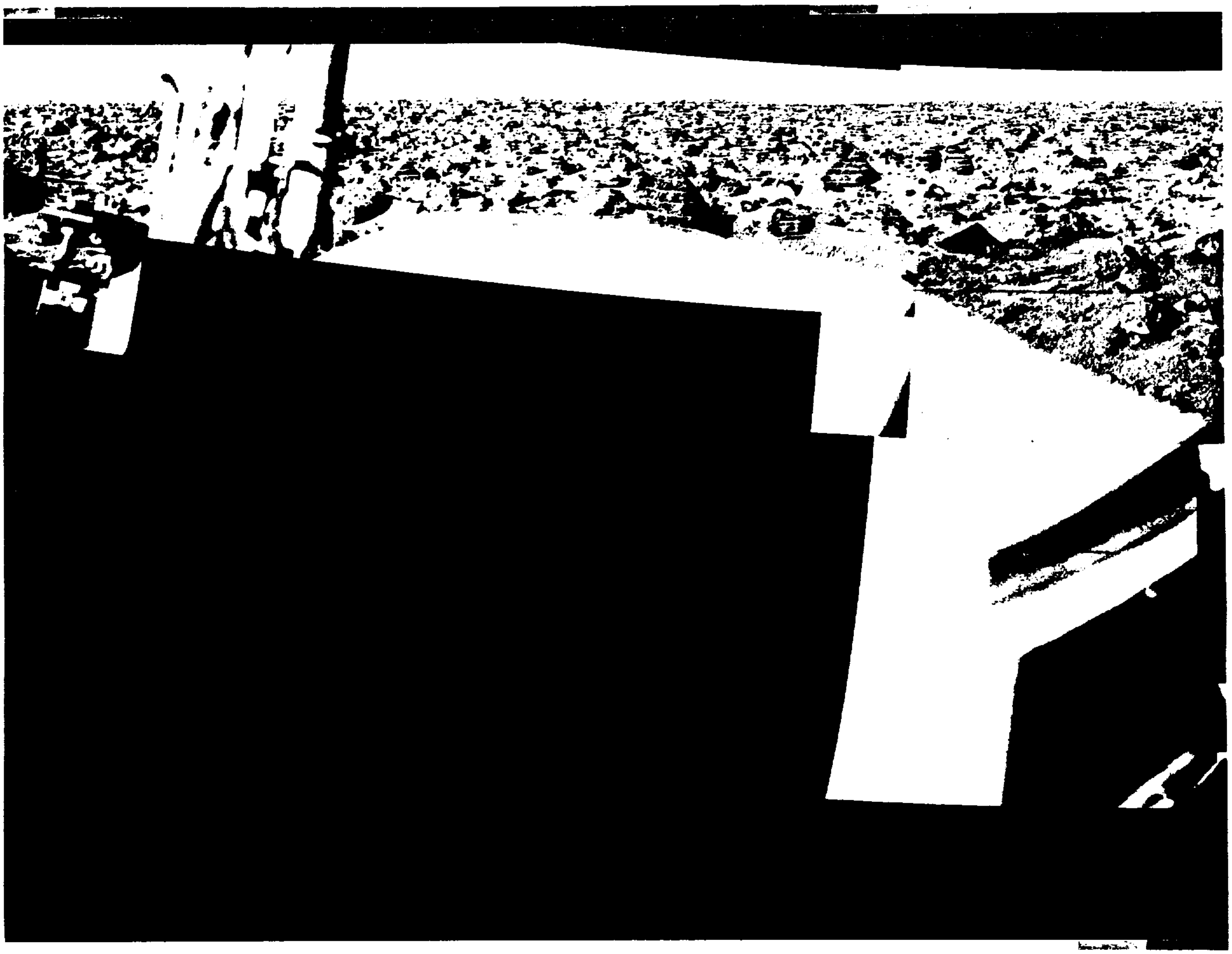


Fig. 49. Elevation Contour Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/04/04/030319.

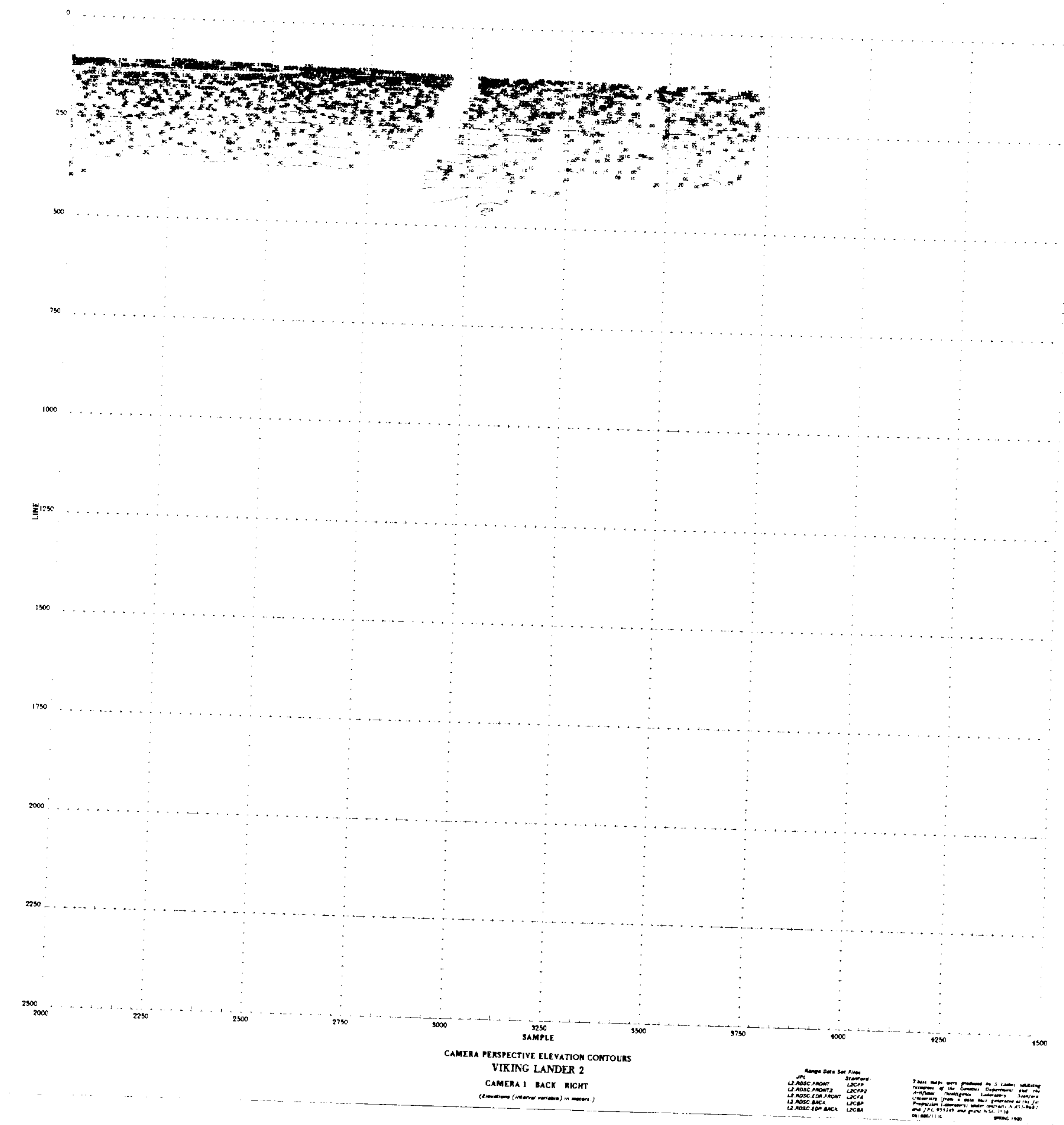


Fig. 50. Camera Perspective Annotated Elevation Contour Lines: Camera 1 (left), back right quadrant.

6.3 Elevation Contour Map Collection

6.3.1 Tabulation of Elevation Contour Map Sheets

The purpose of the following tabulation is to facilitate paging to desired map sheets, as well as to indicate which sheets have been produced. A separate tabular array is presented for each scale. The rows and columns of the matrices are labled with the parameters of the sheet array designators (see section 3.3) of the individual map sheets. The column labeling indicates the value of the first parameter of the designator, and the row labeling indicates the second parameter of the designator. The array entries associated with the designators indicate the page number upon which the sheet may be found.

VL2 Contour Sheets				Scale 1:2000			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				161			
−2							
−4							
−4							
−6							

VL2 Contour Sheets					Scale 1:100			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				168	169			
−1				170	171			
−3								
−5								
−7								

VL2 Contour Sheets					Scale 1:5			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			203	204	205	206		
+1			207	208	209	210		
−1								
−3			211					
−5								
−7								

VL2 Contour Sheets				Scale 1:1000			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				162			
−2							
−4							
−4							
−6							

VL2 Contour Sheets					Scale 1:50			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				172	173			
−1				174	175			
−3								
−5								
−7								

VL2 Contour Sheets					Scale 1:2			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5			212	213	214	215		
+3		216	217	218	219	220	221	
+1								
−1								
−3								
−5								
−7								

VL2 Contour Sheets				Scale 1:500			
	−6	−4	−2	+0	+2	+4	+6
+6							
+4							
+2							
+0				163			
−2							
−4							
−4							
−6							

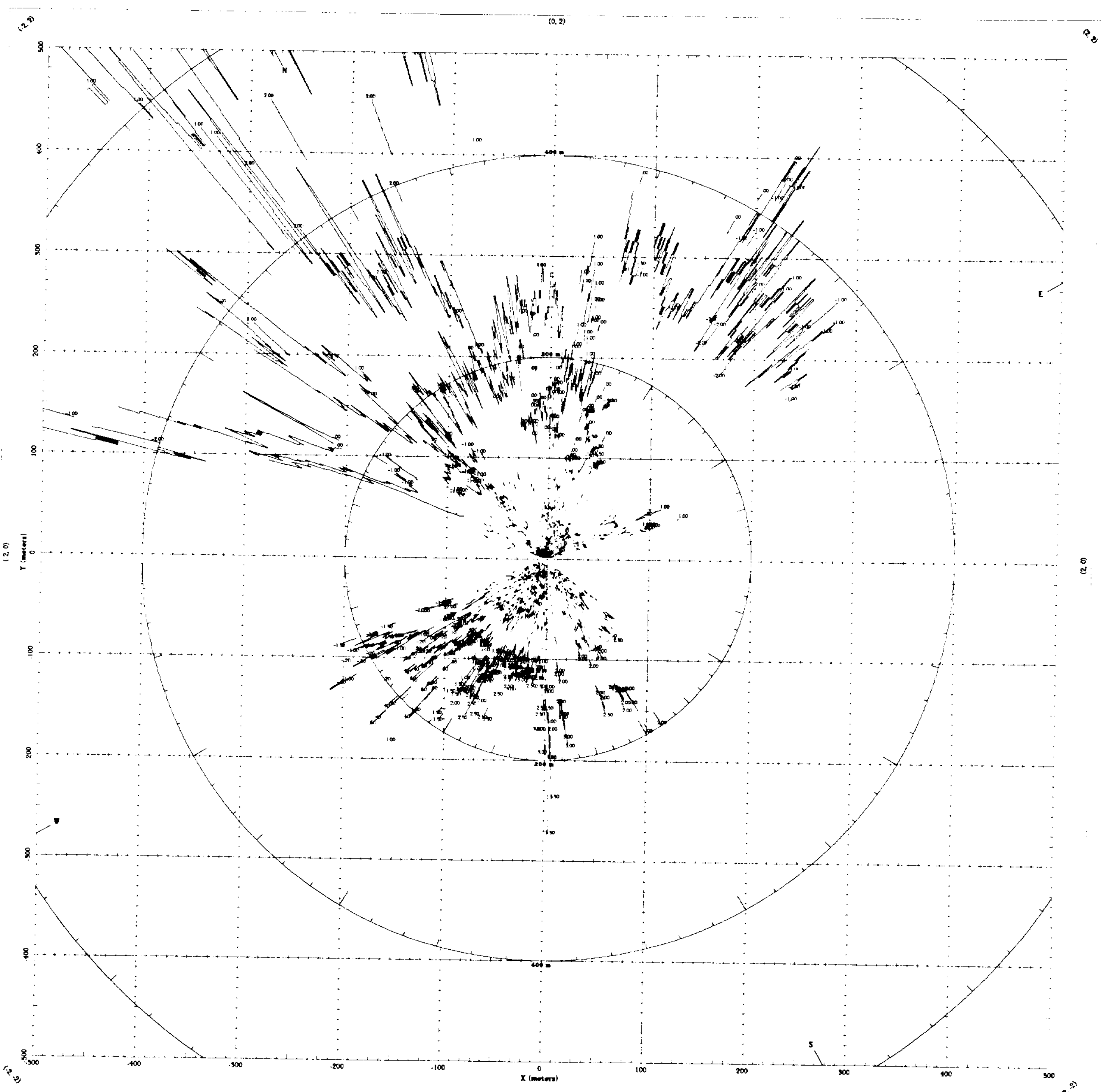
VL2 Contour Sheets					Scale 1:20			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			176	177	178	179		
+1			180	181	182	183		
−1			184	185				
−3			186	187	188	189		
−5								
−7								

VL2 Contour Sheets					Scale 1:1			
	−7	−5	−3	−1	+1	+3	+5	+7
+7	222	223	224			225		
+5								226
+3								
+1								
−1								
−3								
−5								
−7								

VL2 Contour Sheets					Scale 1:200			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3								
+1				164	165			
−1				166	167			
−3								
−5								
−7								

VL2 Contour Sheets					Scale 1:10			
	−7	−5	−3	−1	+1	+3	+5	+7
+7								
+5								
+3			190	191	192	193		
+1			194	195	196	197		
−1			198	199				
−3			200	201		202		
−5								
−7								

Table 2. Tabulation of Elevation Contour Map Sheets.



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2000 SHEET (0, 0)

(Elevations (interval variable) in meters.)

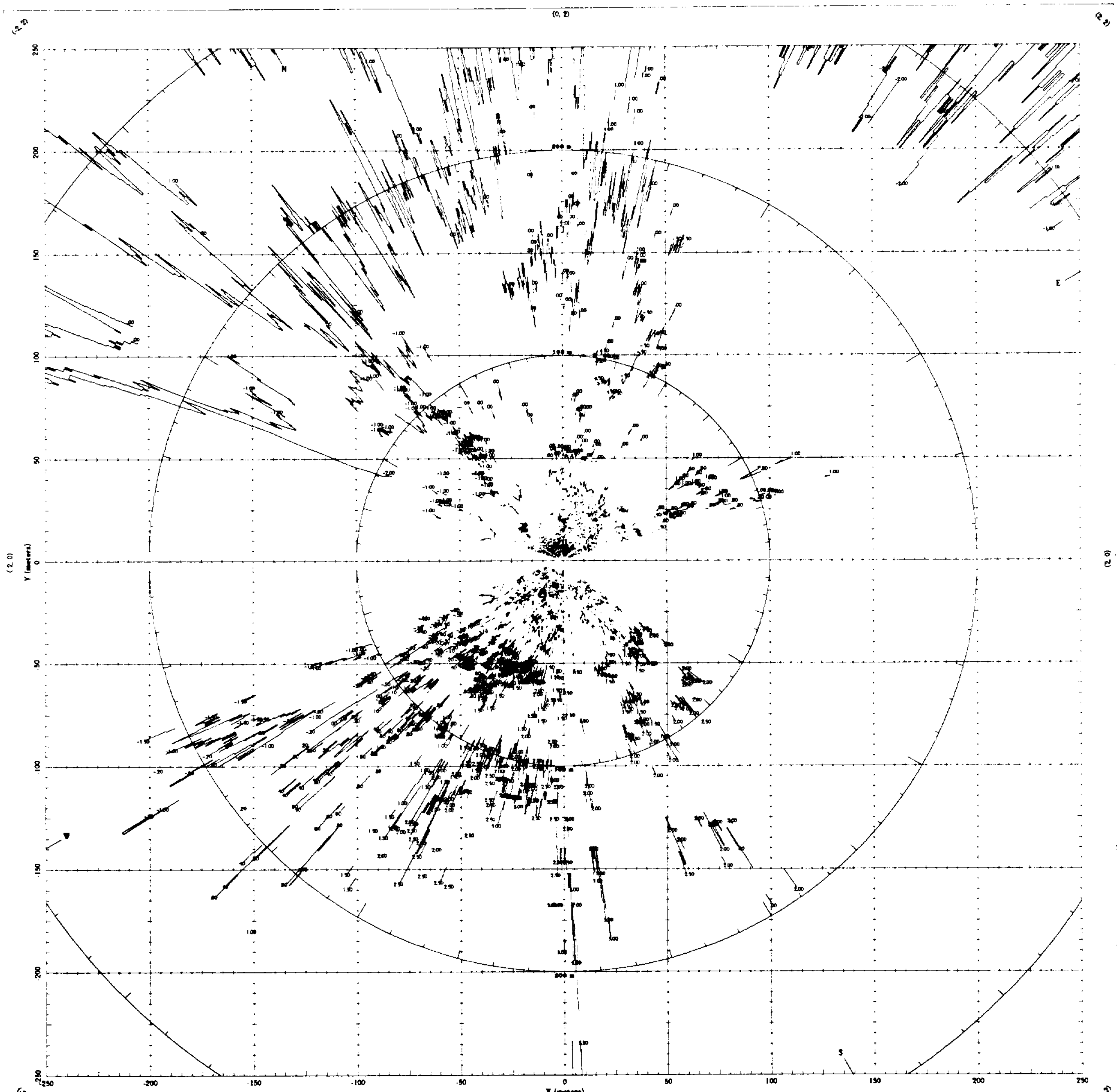
(0, -2)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9552429, and grant NSG 7134.

10197960726 OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 1000 SHEET (0, 0)

(Elevations (interval variable) in meters.)

(0, -2)

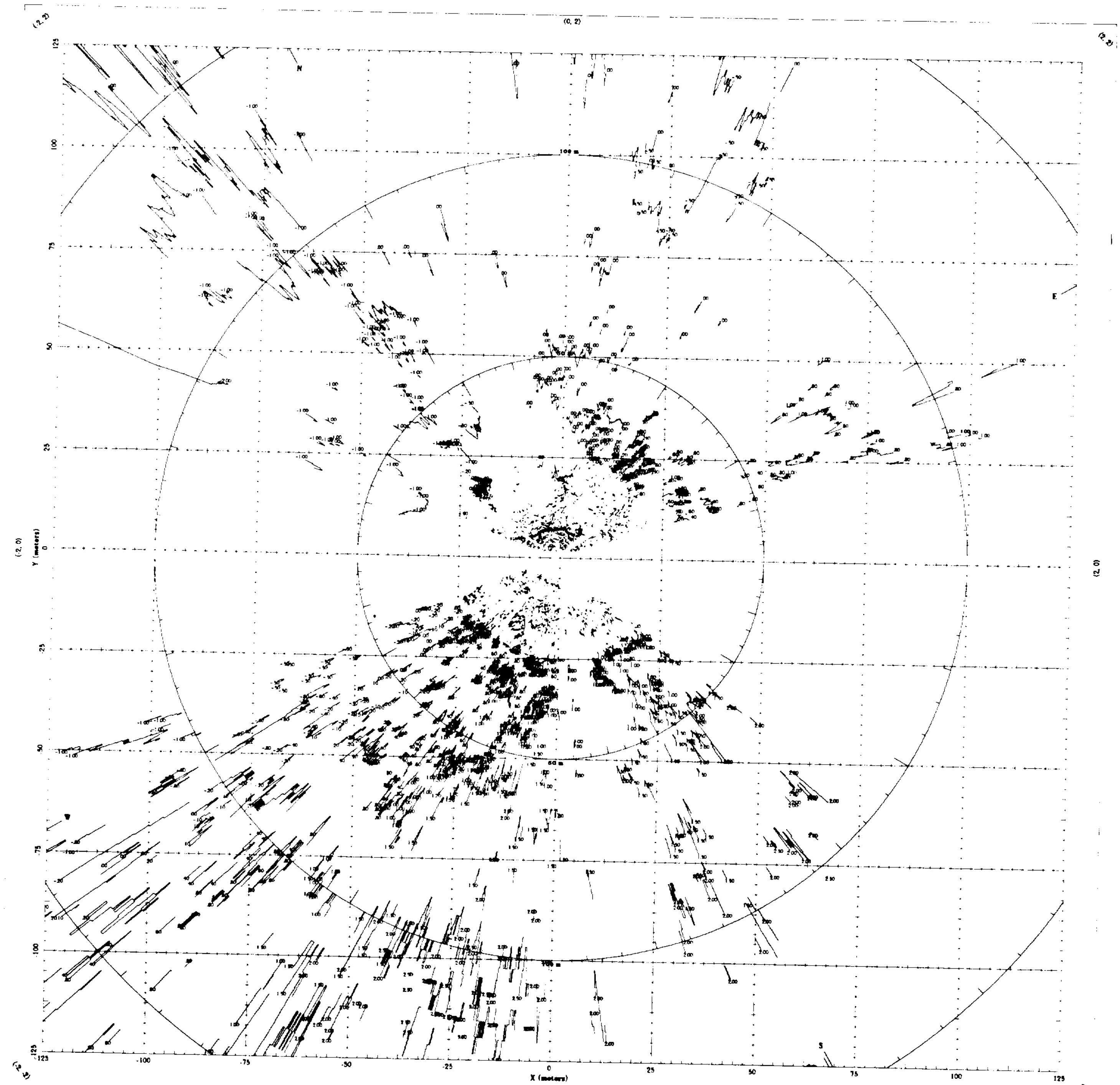
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.153 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDGC.FRONT	L2CFP
L2.RDGC.FRONT2	L2CFP2
L2.RDGC.ZDR.FRONT	L2CFR
L2.RDGC.BACK	L2CBP
L2.RDGC.ZDR.BACK	L2CBR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 9552429, and grant NSC 7336

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.153 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 500 SHEET (0, 0)

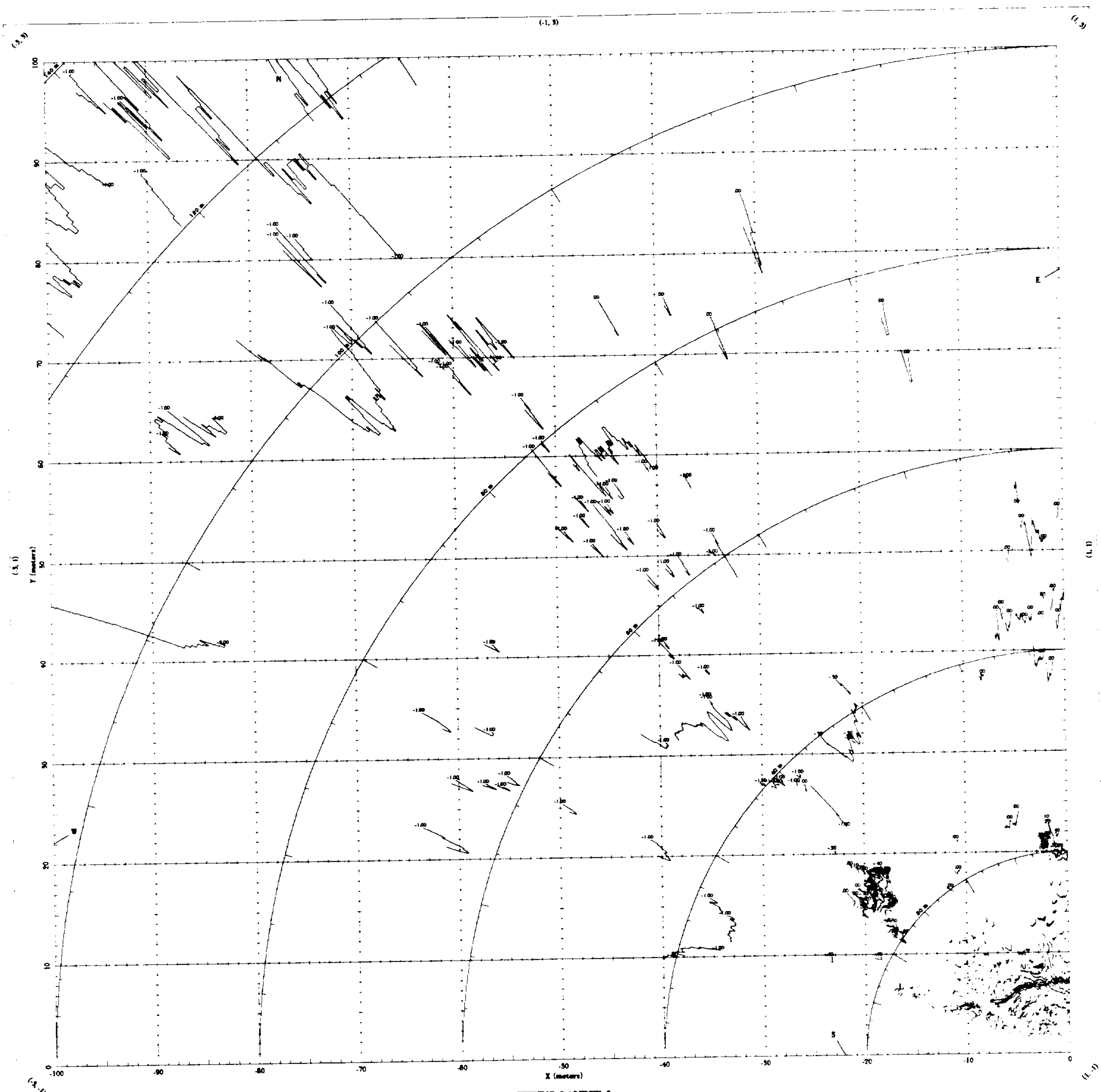
(Elevations (interval variable) in meters.)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by ... Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts ... and grant ...

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 200 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

(-1, -1)

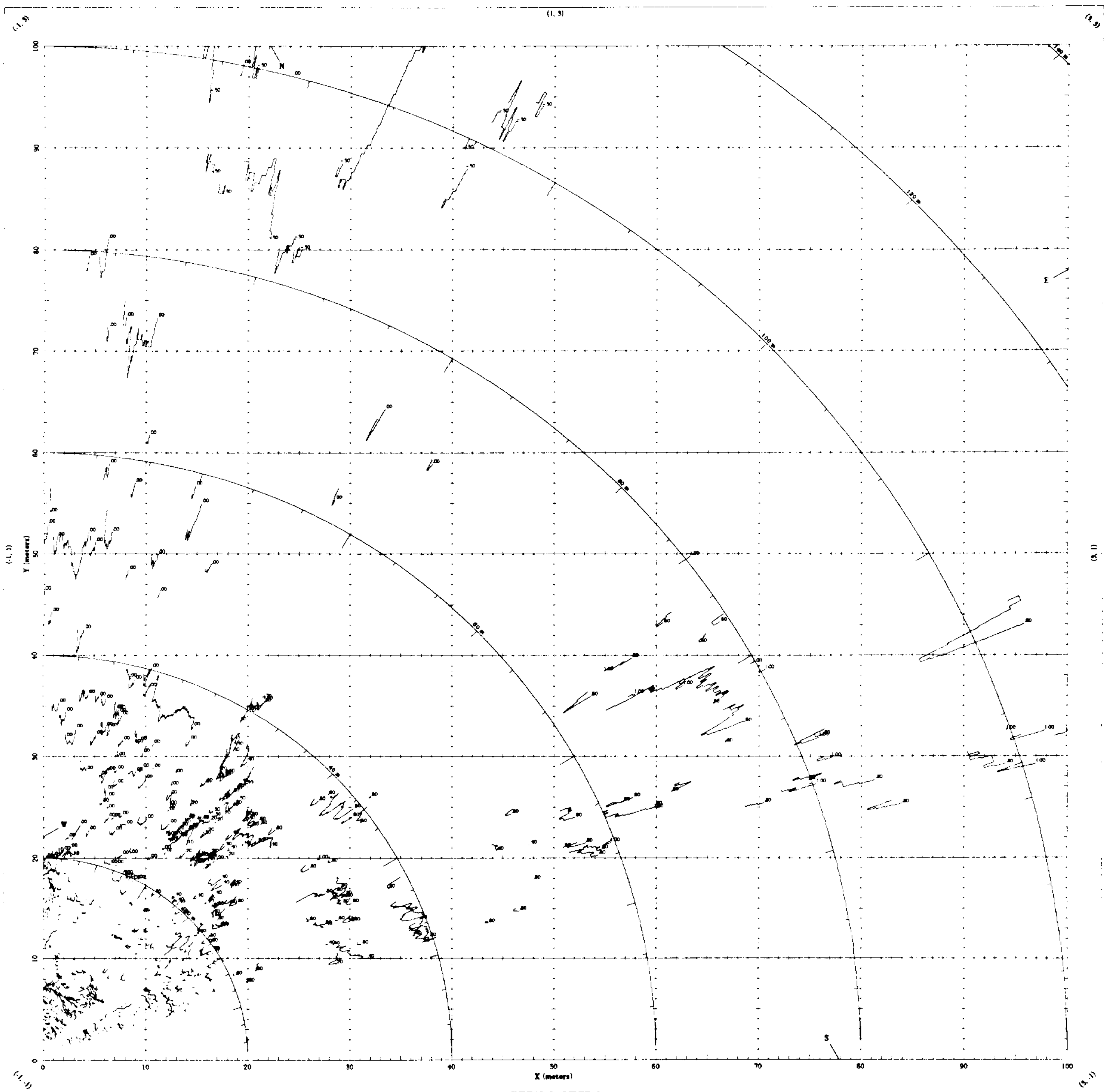
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 20.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.ROSC.FRONT	L2CFP
L2.ROSC.FRONT2	L2CFP2
L2.ROSC.EDR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 9552429, and grant NSG 7138.

1020 [illegible] OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 200 SHEET (1, 1)

(Elevations (interval variable) in meters.)

(1, -1)

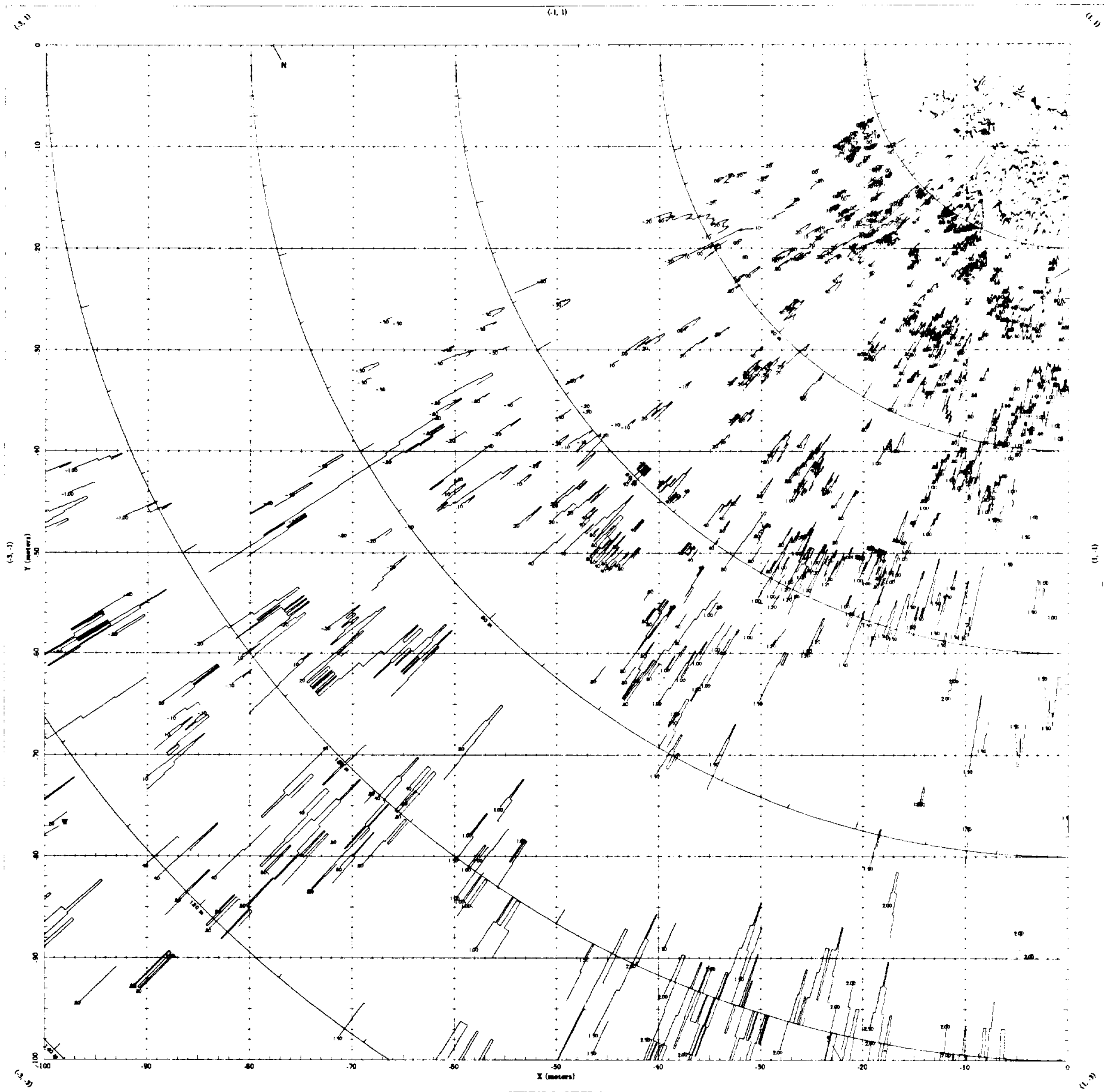
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9552429, and grant NSG 7198.

1020 [illegible] OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 200 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

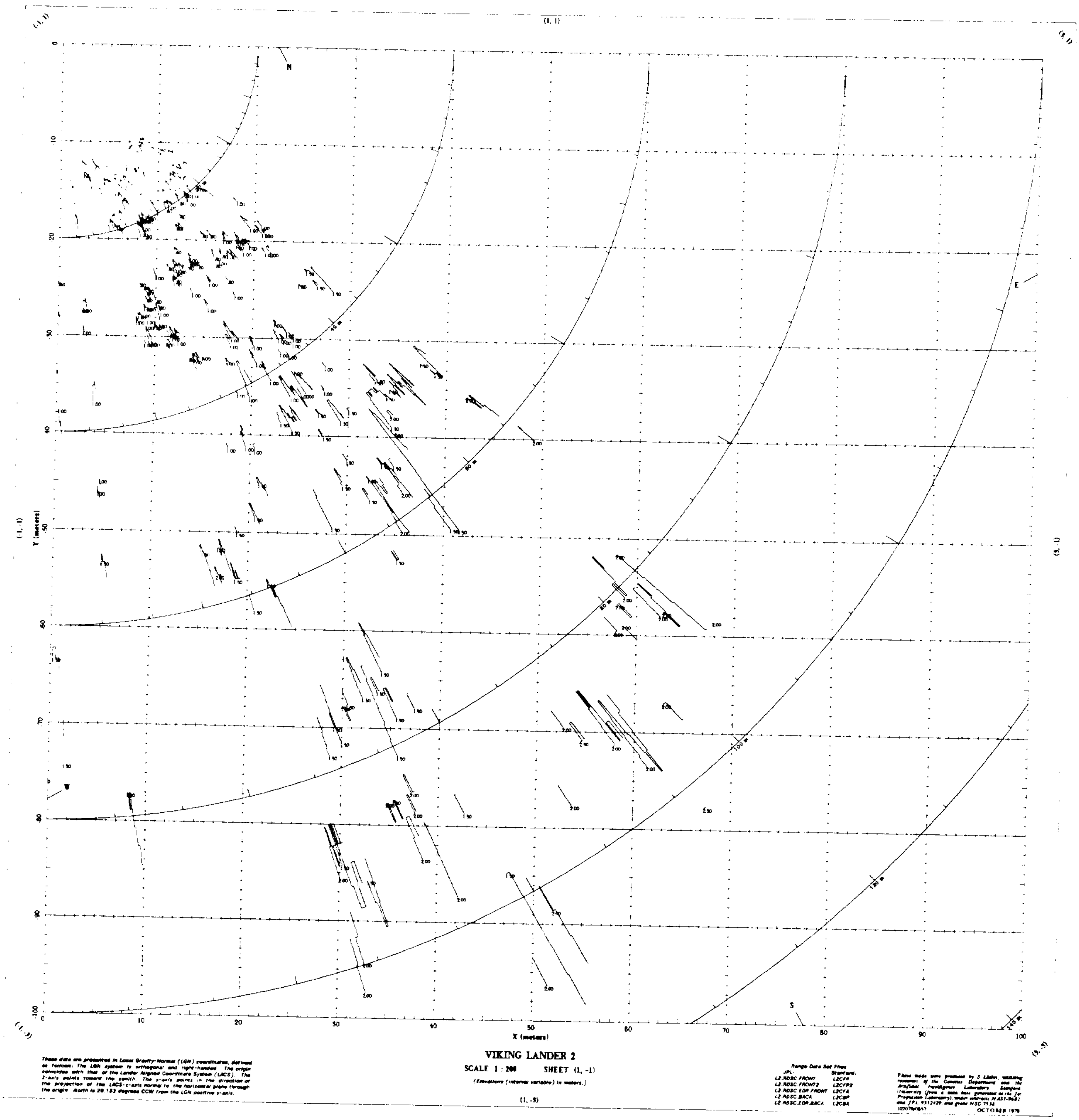
(-1, -3)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 20.133 degrees CCW from the LGN positive y-axis

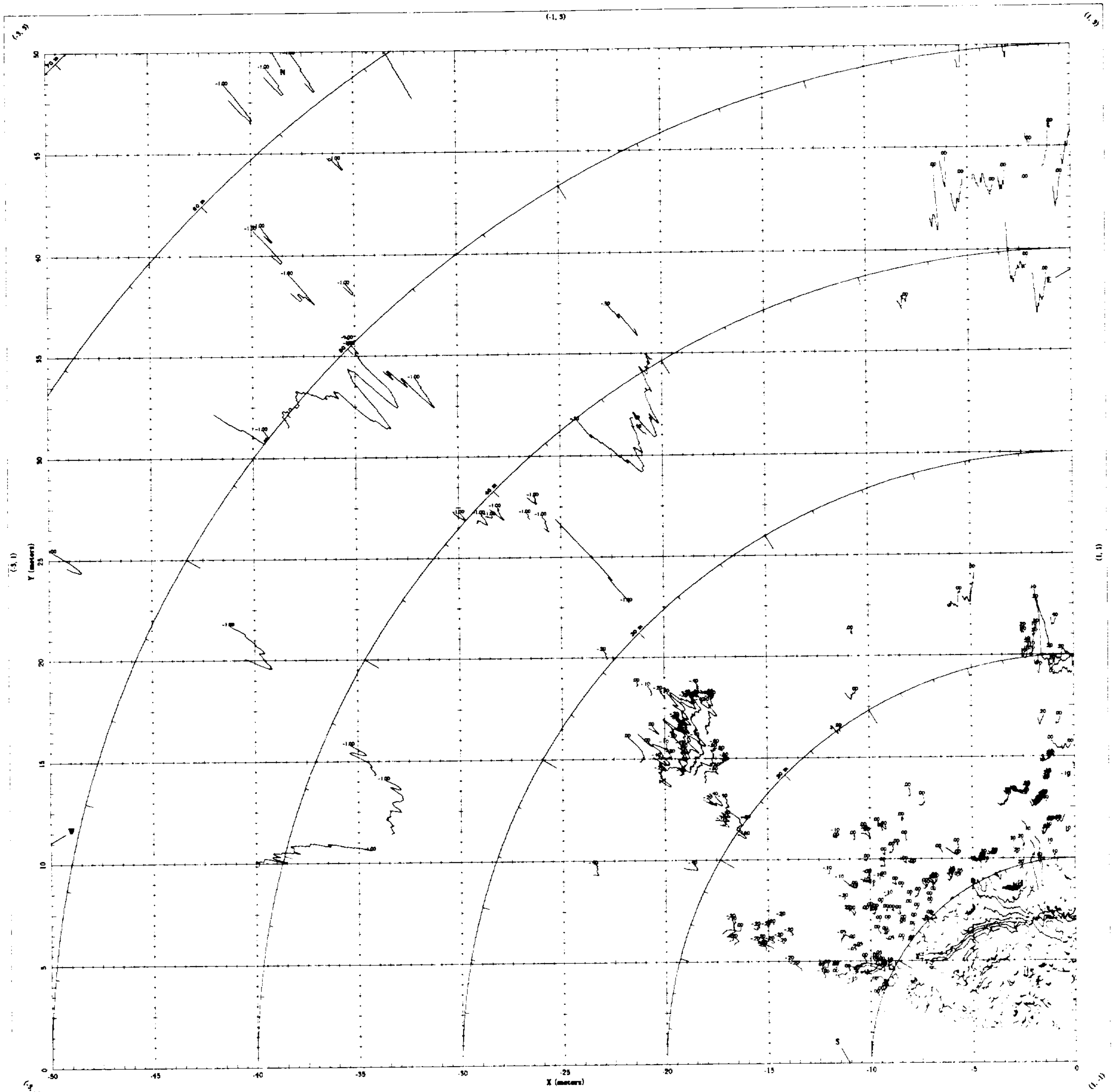
Range Data Set Files	
JPL	Stanford
L2 RDSC FRONT	L2CFP
L2 RDSC FRONT2	L2CFP2
L2 RDSC EDR FRONT	L2CFA
L2 RDSC BACA	L2CBP
L2 RDSC EDR BACA	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9511429, and grant NSC 7536

1020790817 OCTOBER 1979



N
E
S
W
X (meters)
Y (meters)
VIKING LANDER 2
SCALE 1 : 200 SHEET (1, -1)
(Elevations (interval variable) in meters.)
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.
Range Data Set Files
JPL: Stanford:
L2.RDSC.FRONT L2CFP
L2.RDSC.FRONT2 L2CFP2
L2.RDSC.EDR.FRONT L2CFA
L2.RDSC.BACK L2CBP
L2.RDSC.EDR.BACK L2CBA
OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 100 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

(-1, -1)

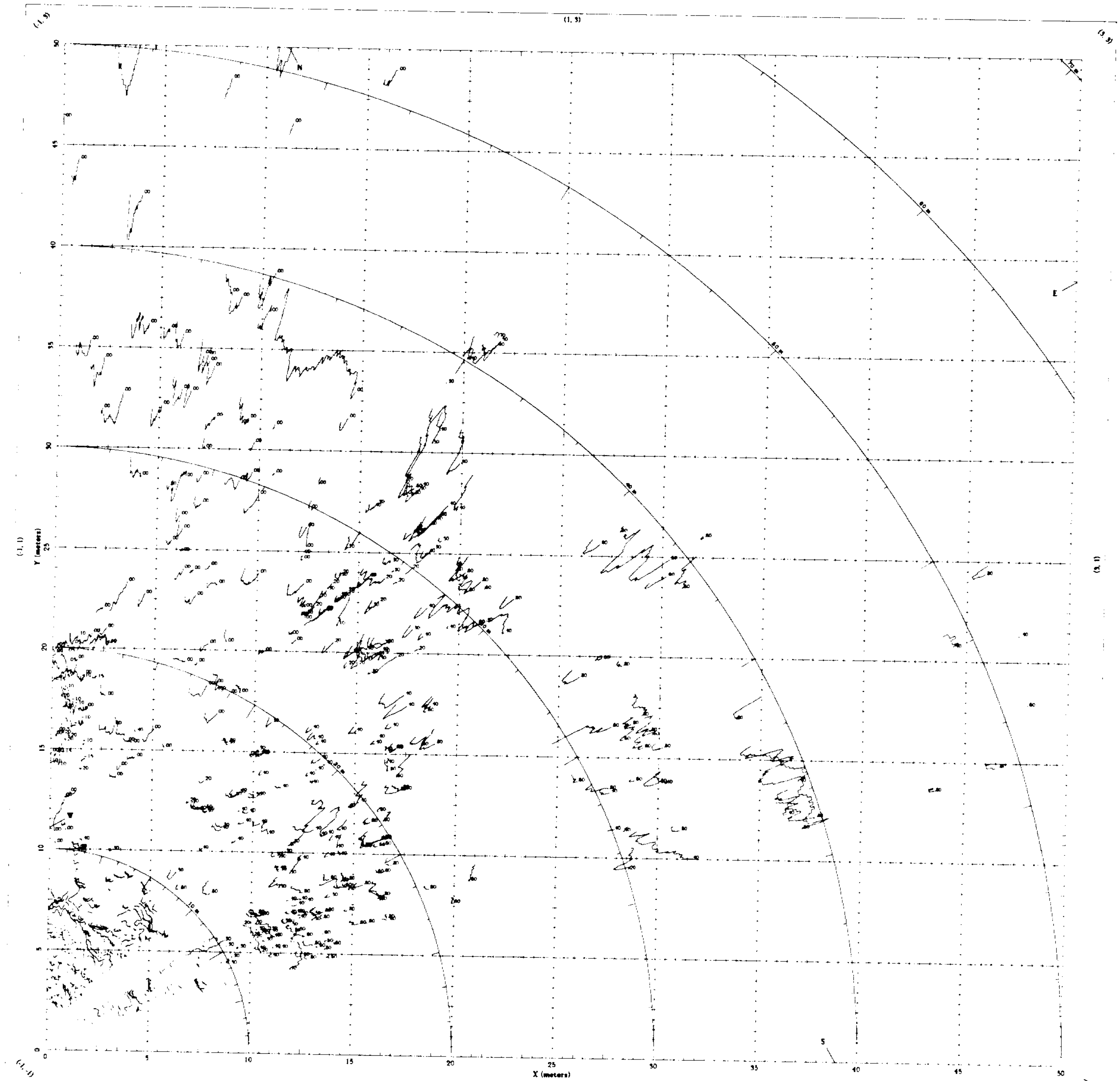
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis

Range Data Set Files

JPL	Stanford
L2.ROSC.FRONT	L2CFF
L2.ROSC.FRONT2	L2CFF2
L2.ROSC.EOR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EOR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9553429, and grant NSG 7338

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 100 SHEET (1, 1)

(Elevations (interval variable) in meters)

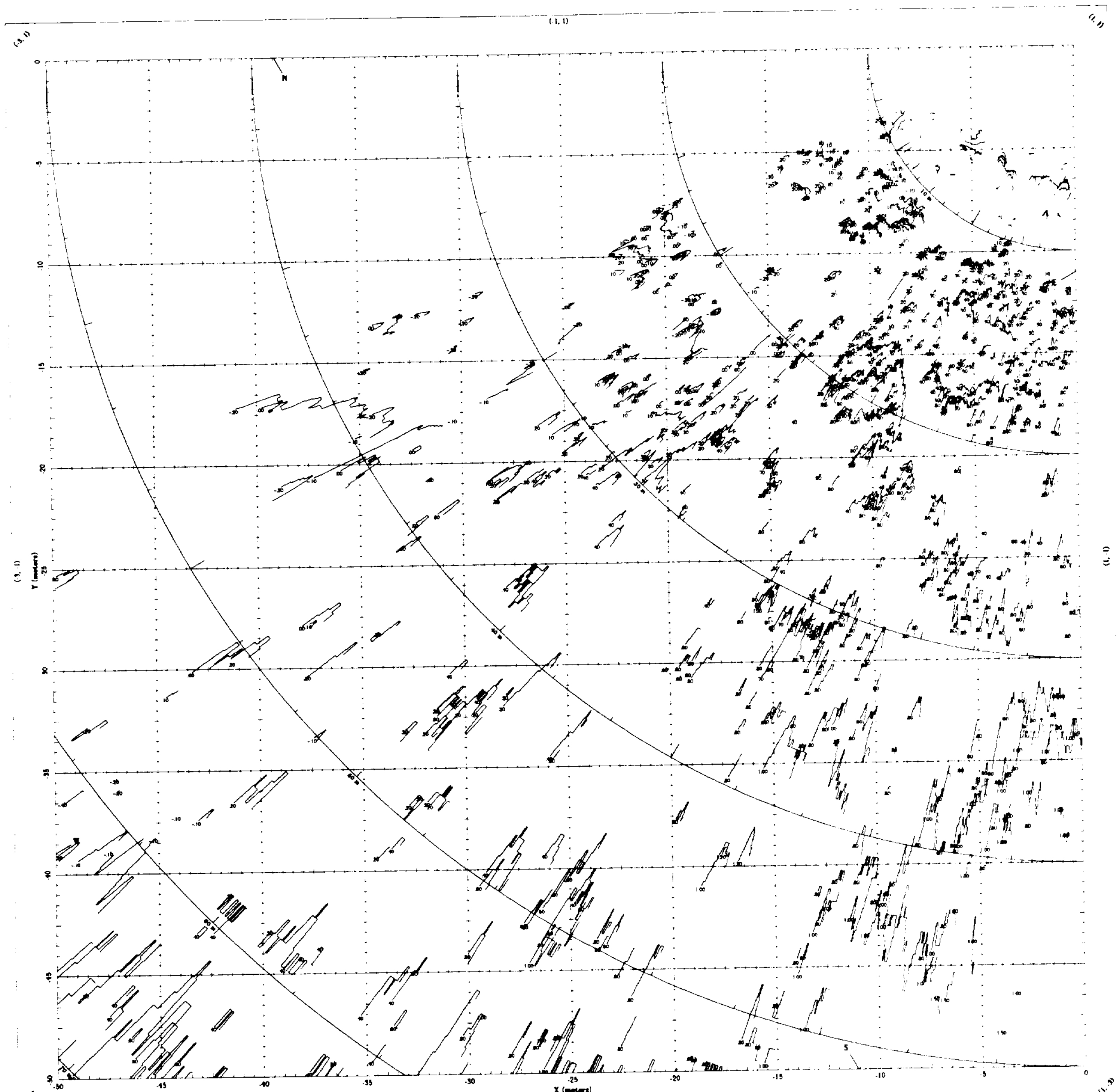
(1, -1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 954420, and grant NSG 7138.

OCTOBER 1978



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 100 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

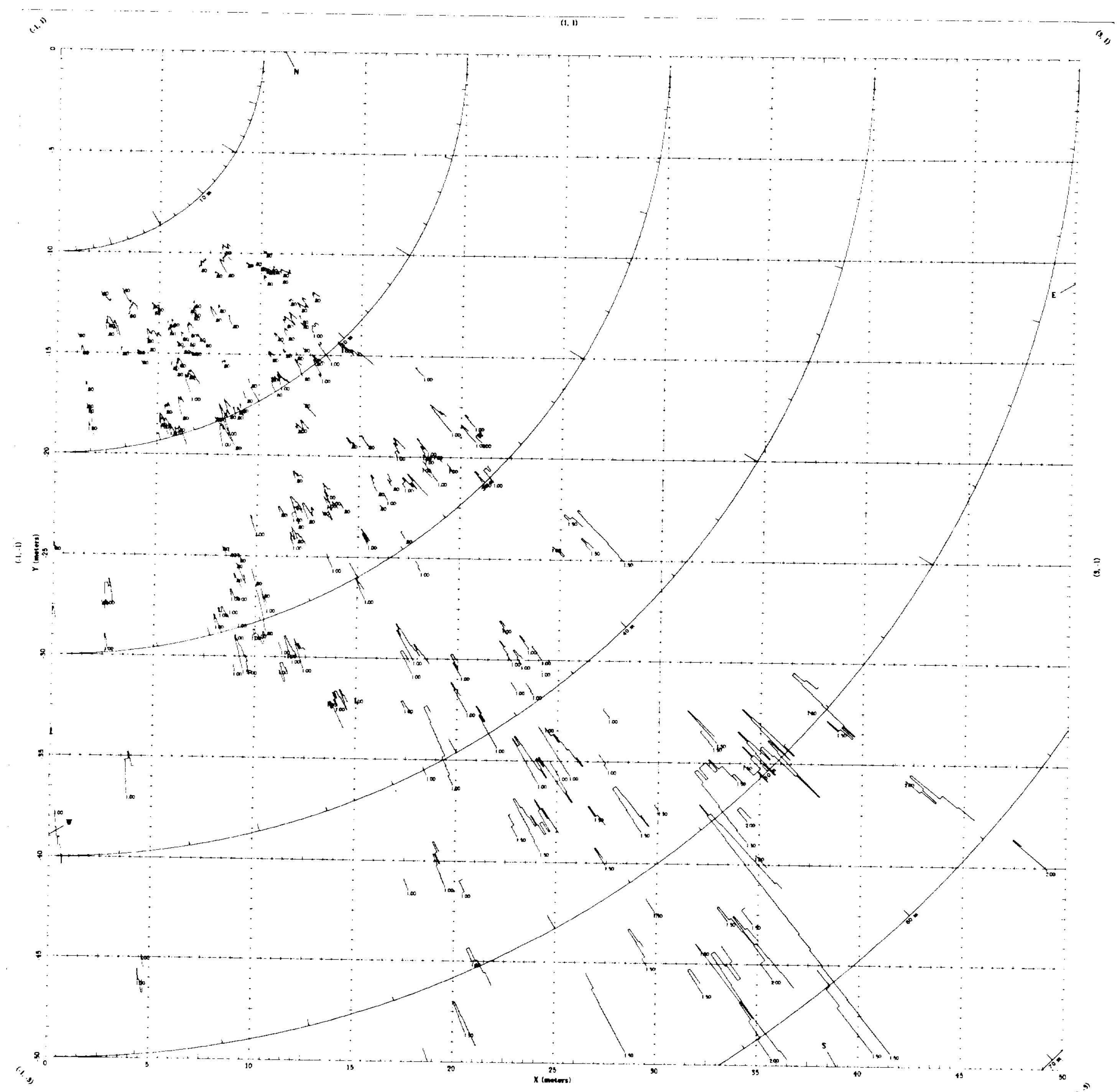
(-1, -3)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9512429, and grant NSG-7190.

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 100 SHEET (1, -1)

(Elevations (interval variable) in meters.)

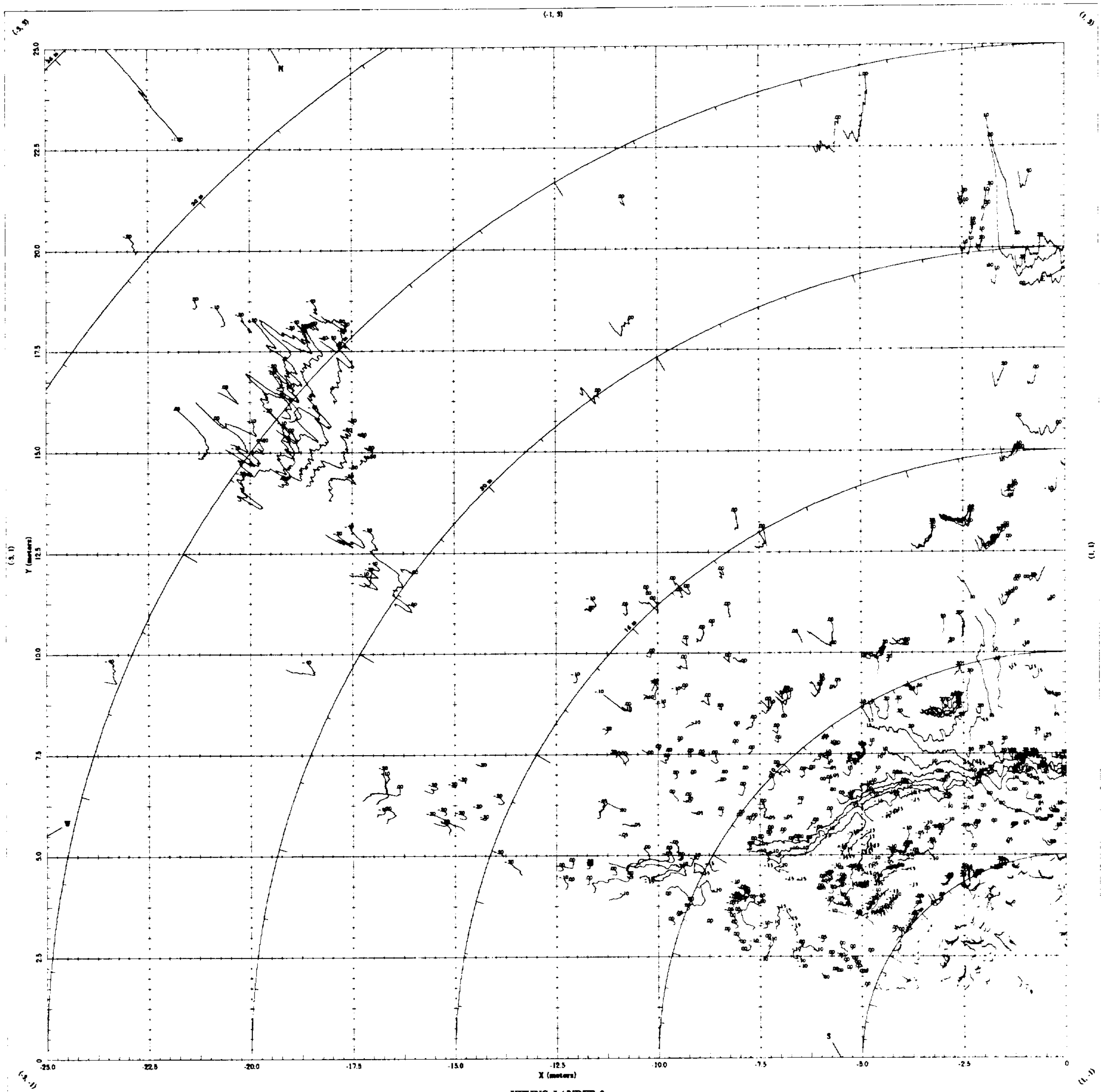
(1, -3)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 9552439, and grant NSG 7538

10207?/0808 OCTOBER 1978



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.153 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 50 SHEET (-1, 1)

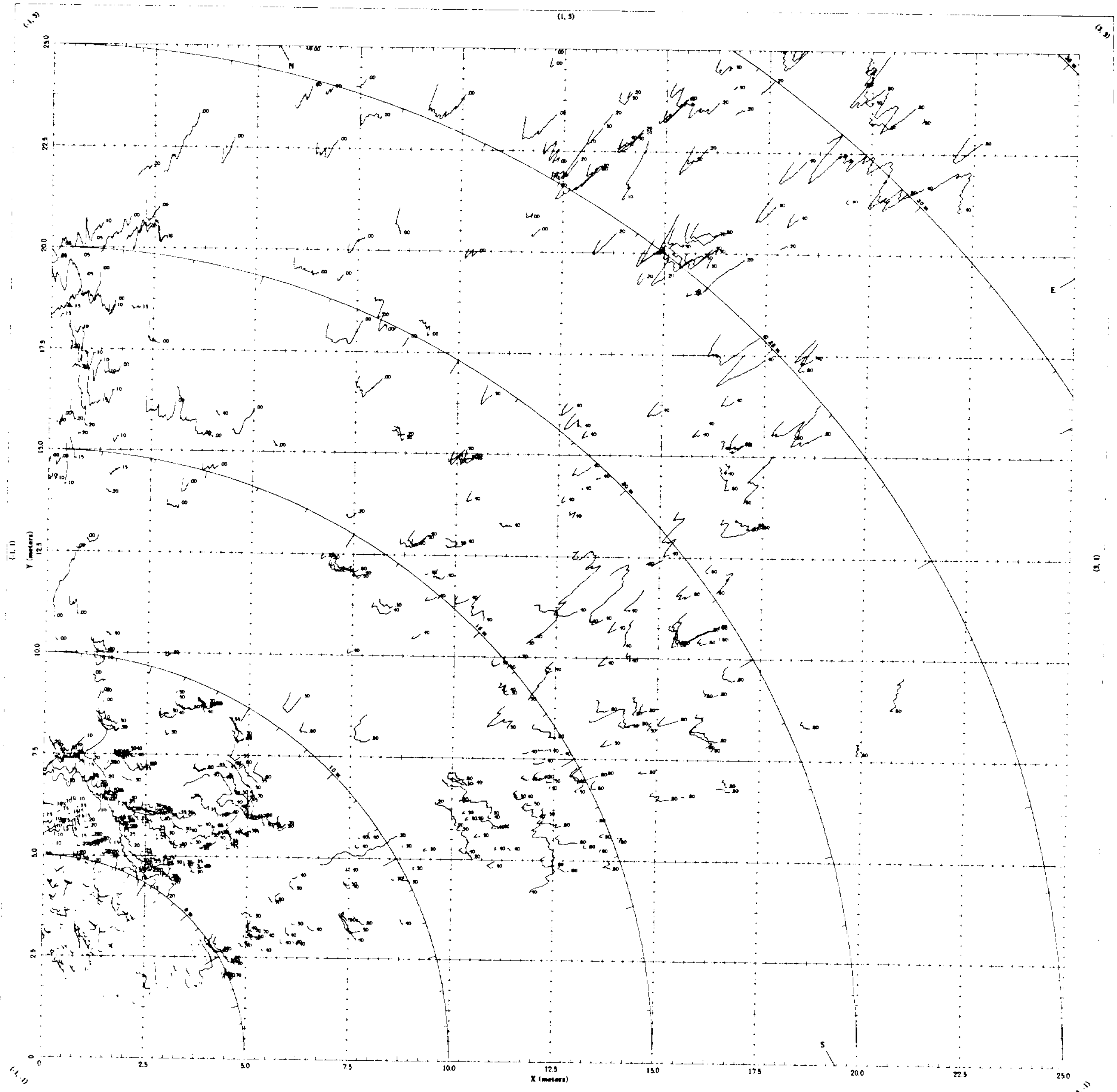
(Elevations (interval variable) in meters.)

(-1, -1)

Range Data Set Files	
JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDA.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDA.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9512429, and grant NSG 7158.

1021780410 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 50 SHEET (1, 1)

(Elevations (interval variable) in meters.)

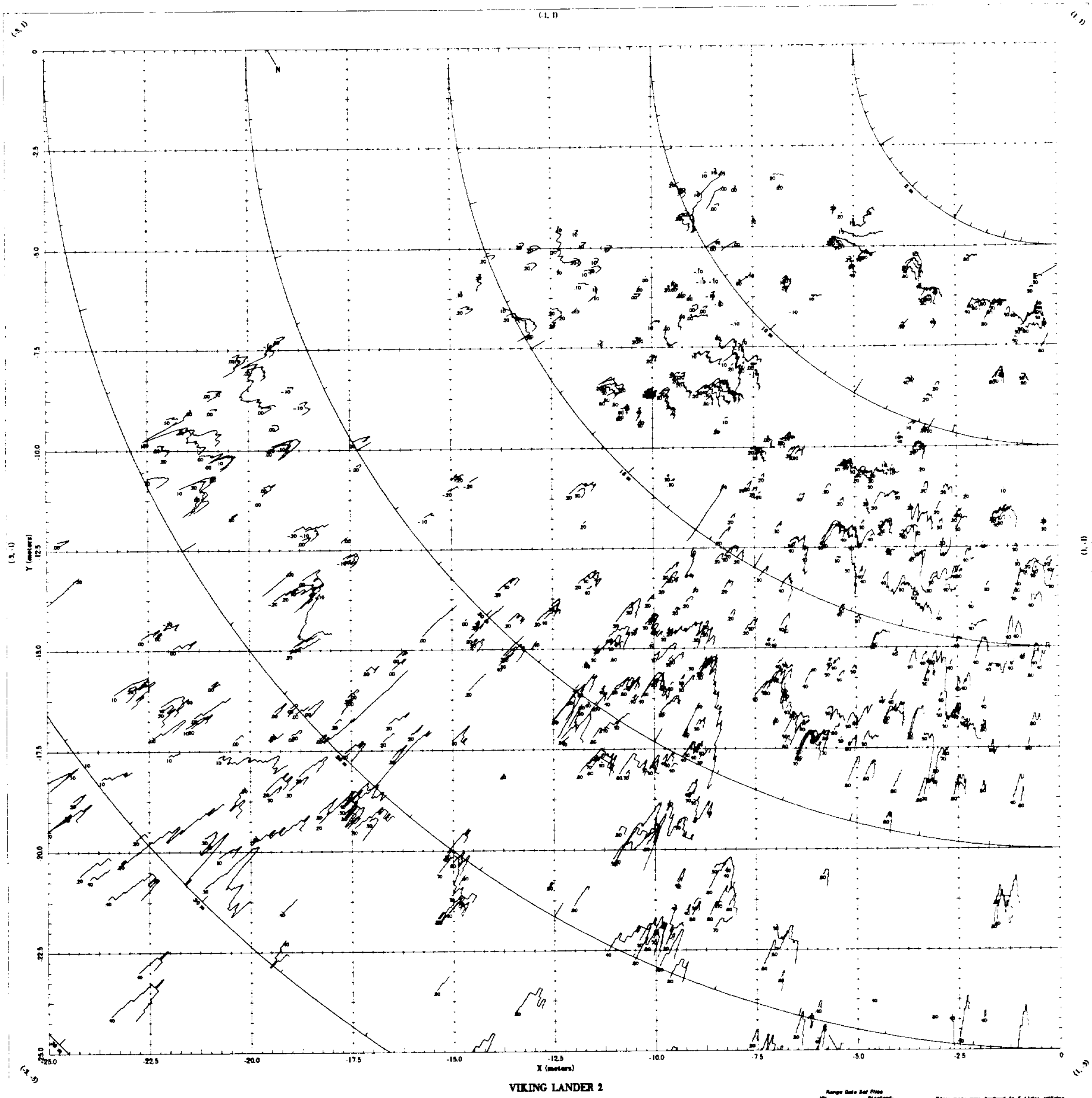
(1, -1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.LDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.LDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9552429, and grant NSG 7538

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.132 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 50 SHEET (-1, -1)

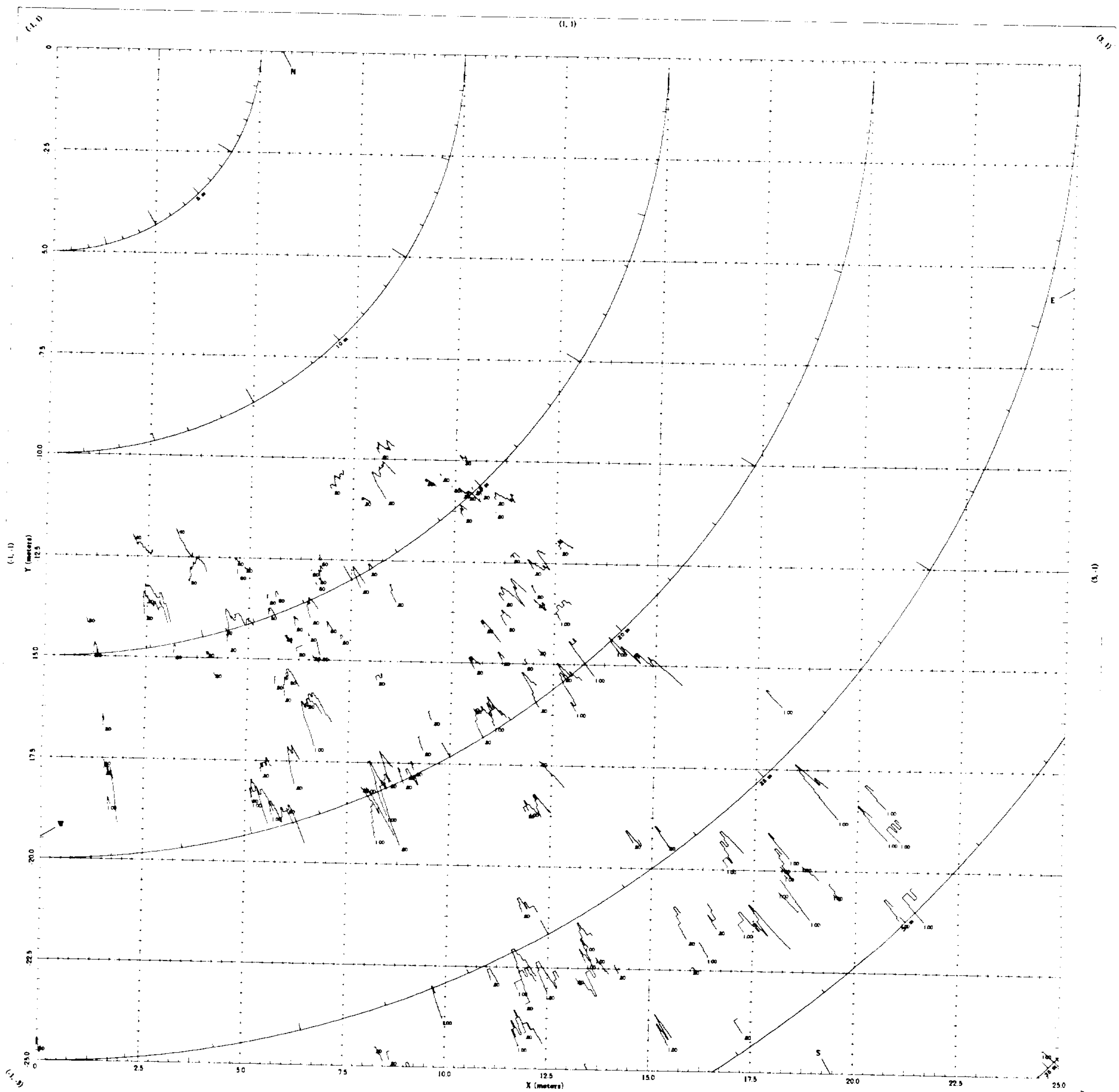
(Elevations (interval variable) in meters.)

(-1, -3)

Range Data Set Files	
JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955342[illegible], and grant NSG 7[illegible]

HR1780490 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 50 SHEET (1, -1)

(Elevations (interval variable) in meters)

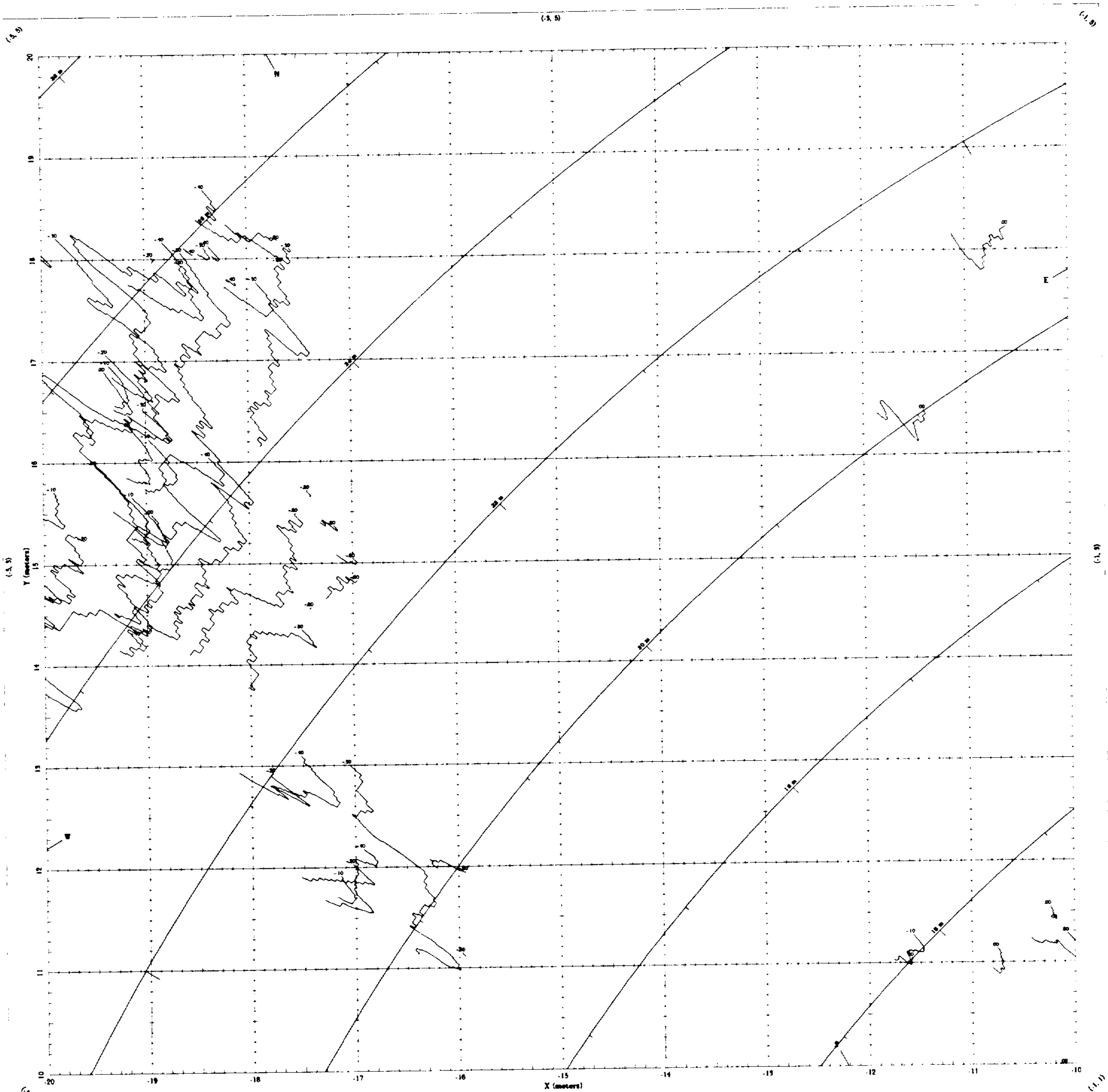
(1, -3)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 9552429, and grant NSG 7538

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

(-3, 1)

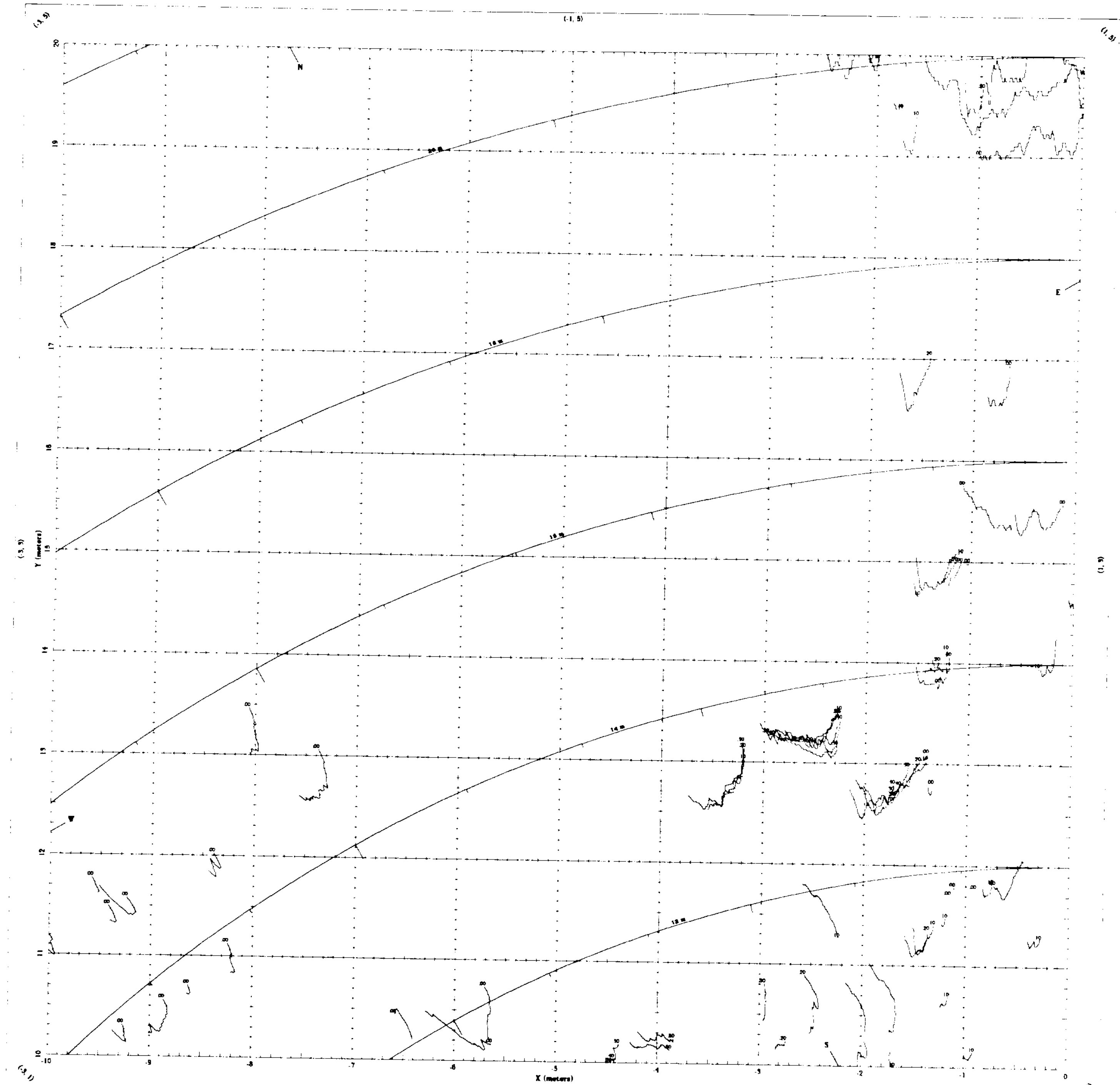
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR BACK	L2CBA

These maps were produced by J. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7538.

102578/0457 OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20   SHEET (-1, 3)

(Elevations (interval variable) in meters.)

(-1, 1)

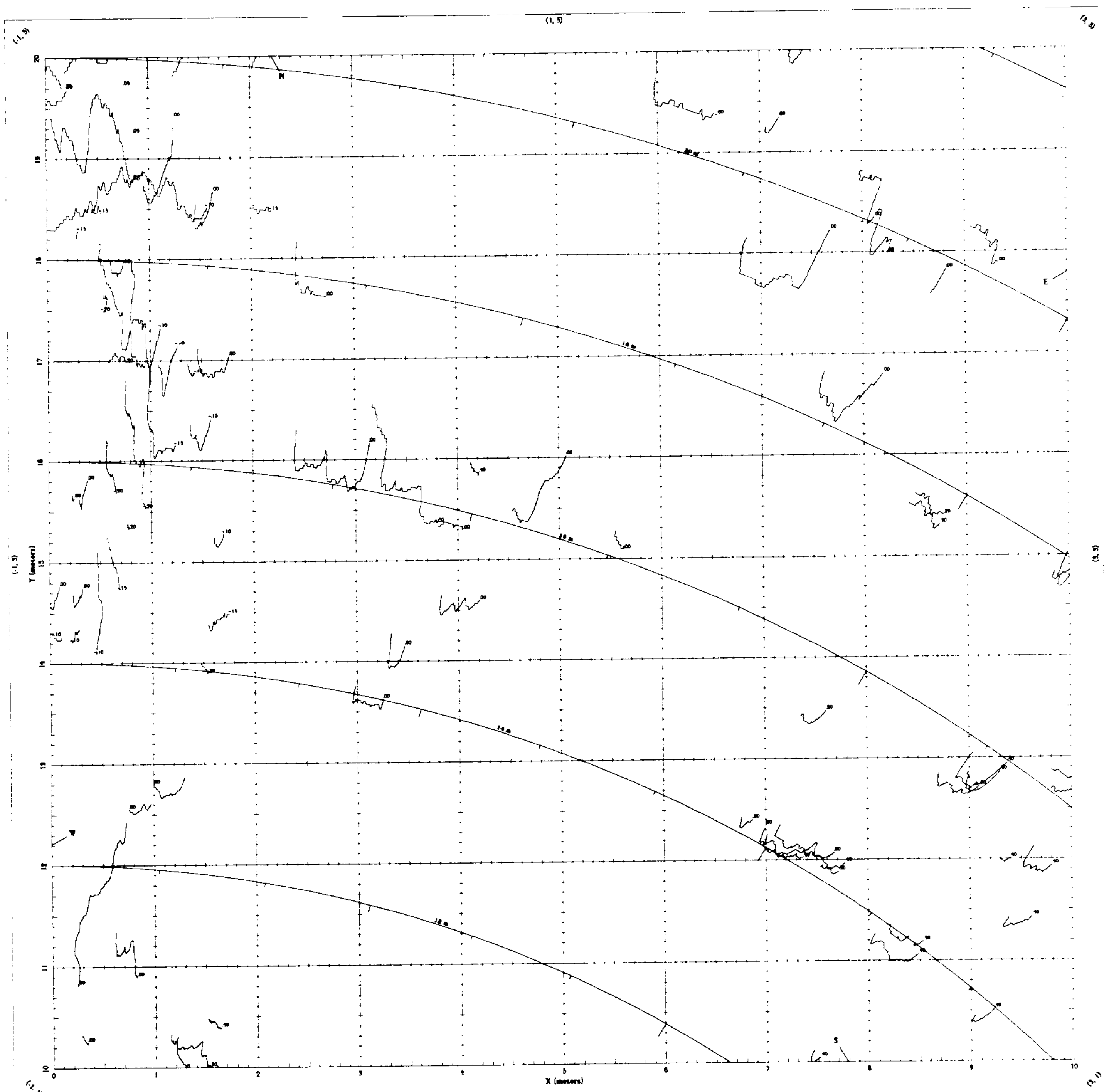
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7118.

1025780411   OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (1, 3)

(Elevations (interval variable) in meters.)

(1, 1)

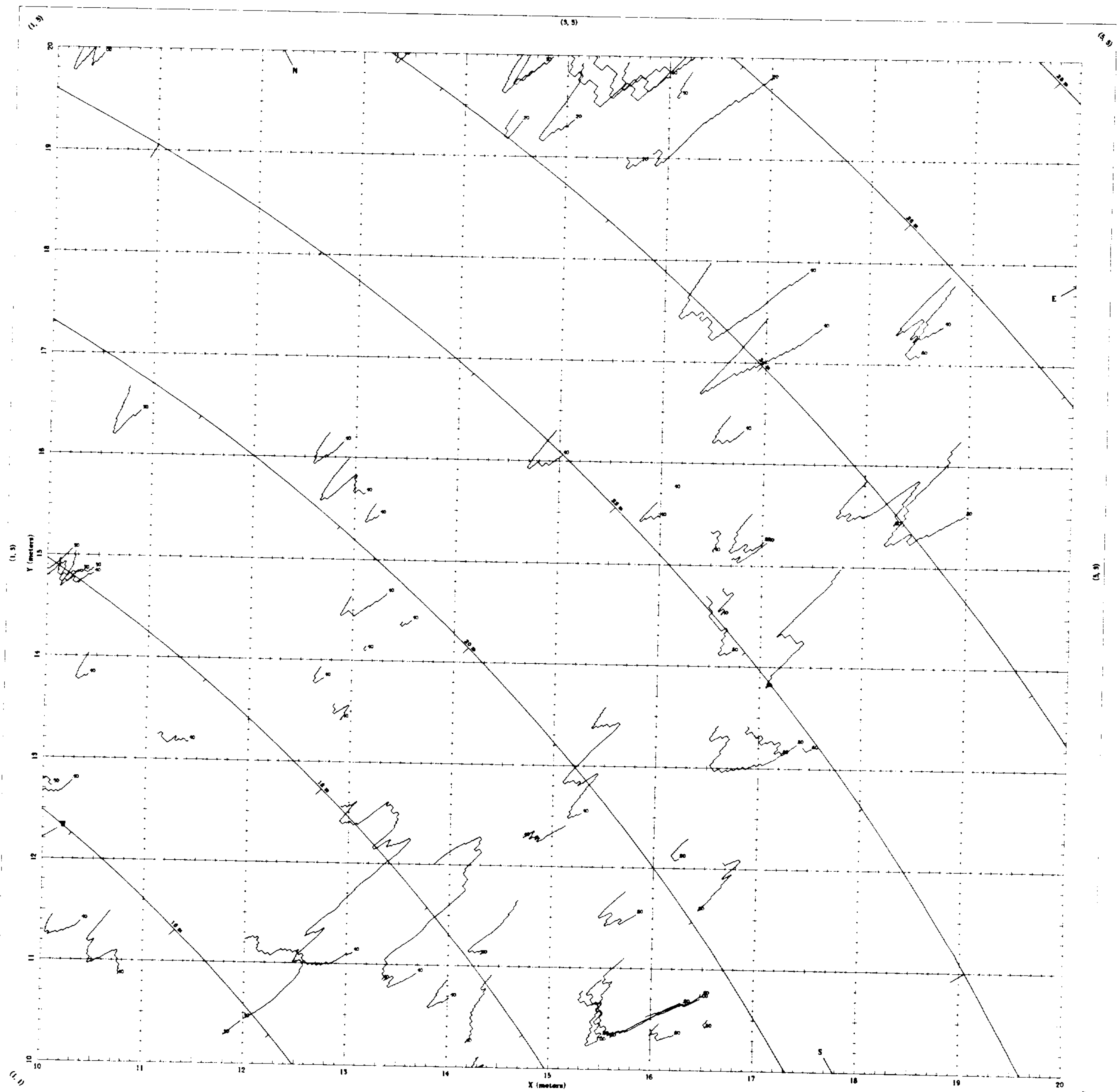
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.183 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7538.

102978/0457 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 20 SHEET (3, 3)

(Elevations (interval variable) in meters.)

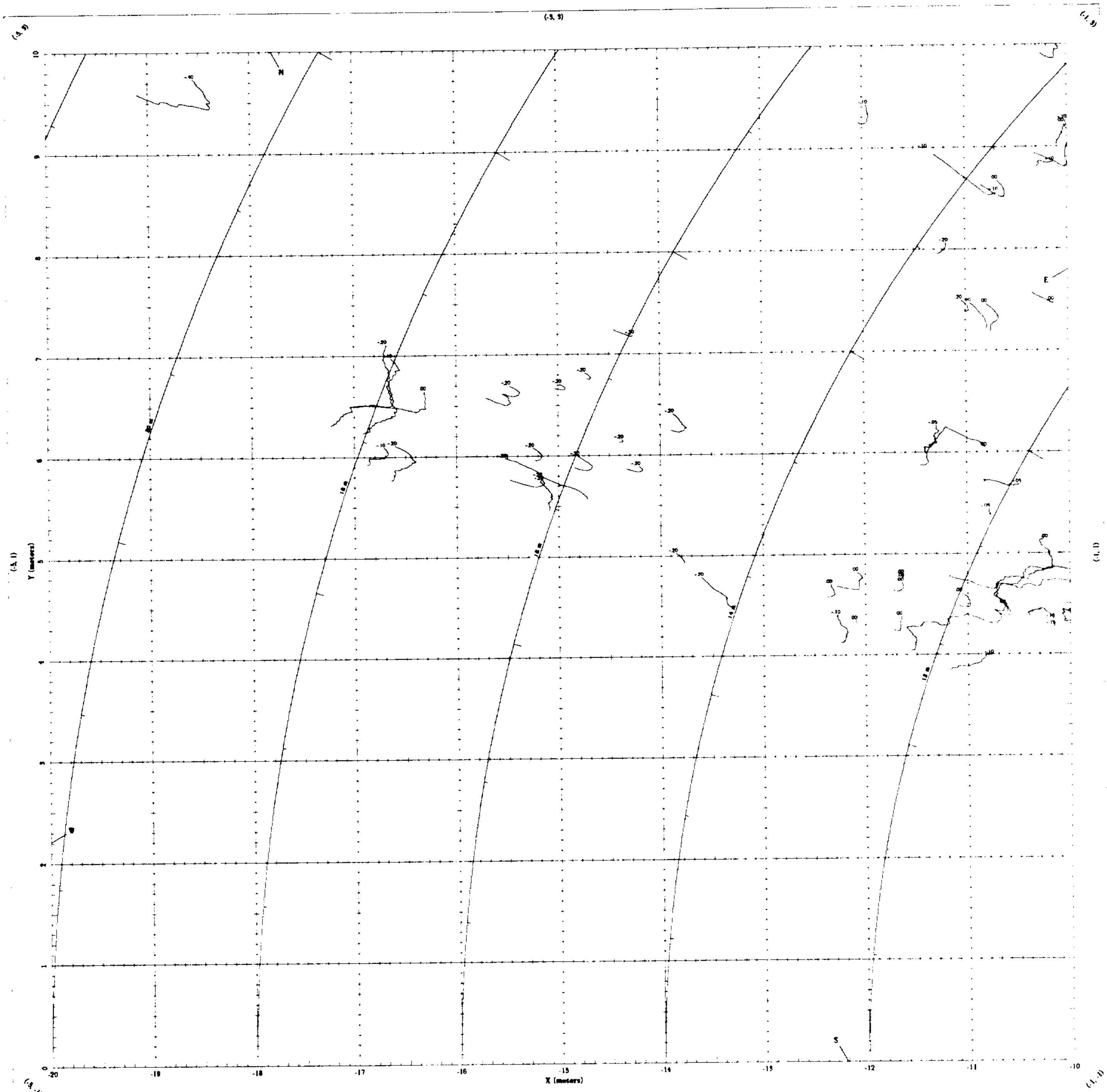
(3, 1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955149, and grant NSG 7136

1029780457 OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (-3, 1)

(Elevations (interval variable) in meters)

(-3, -1)

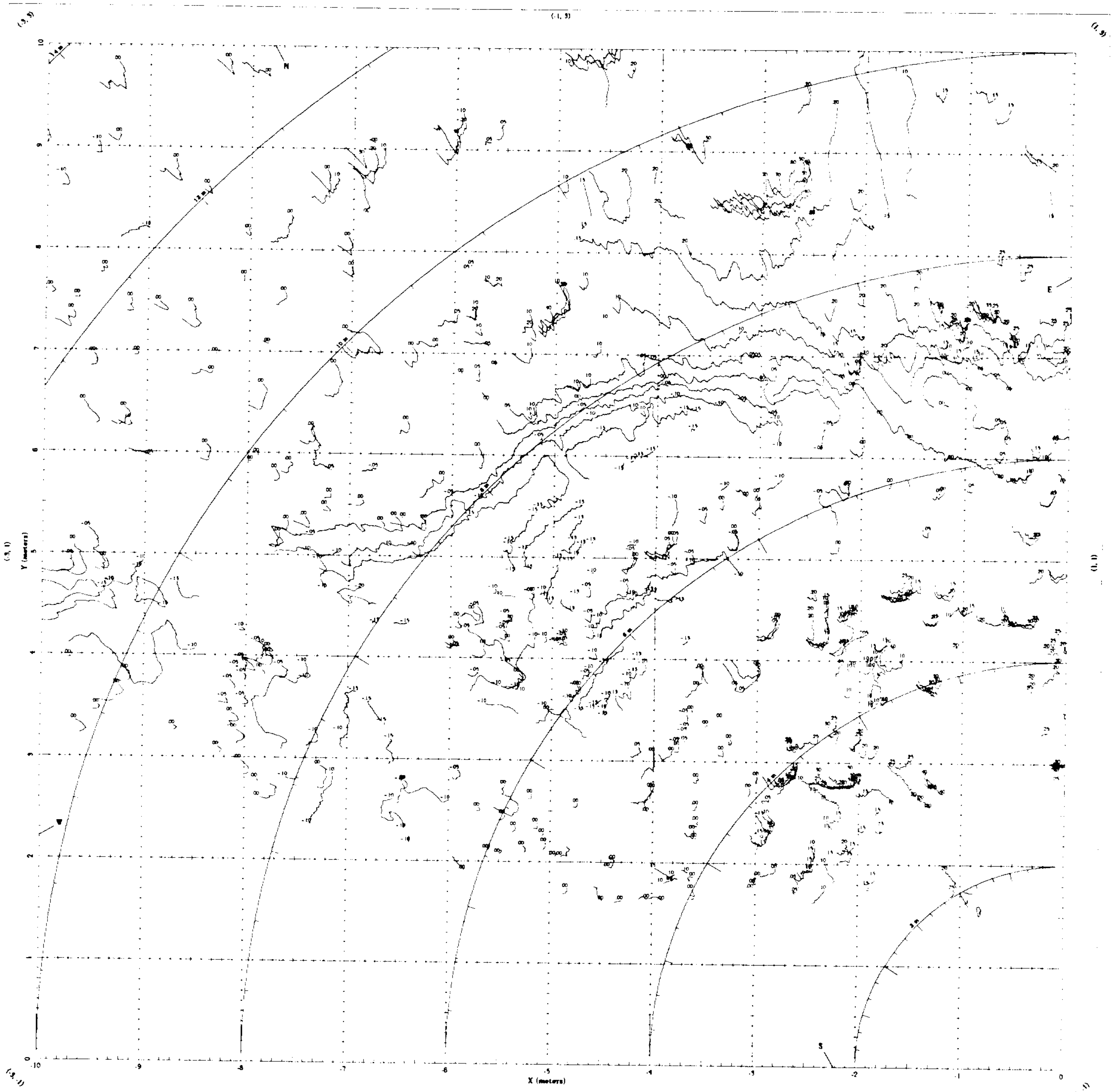
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL [illegible], and grant [illegible]

[illegible] OCTOBER [illegible]



VIKING LANDER 2

SCALE 1 : 20 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

(-1, -1)

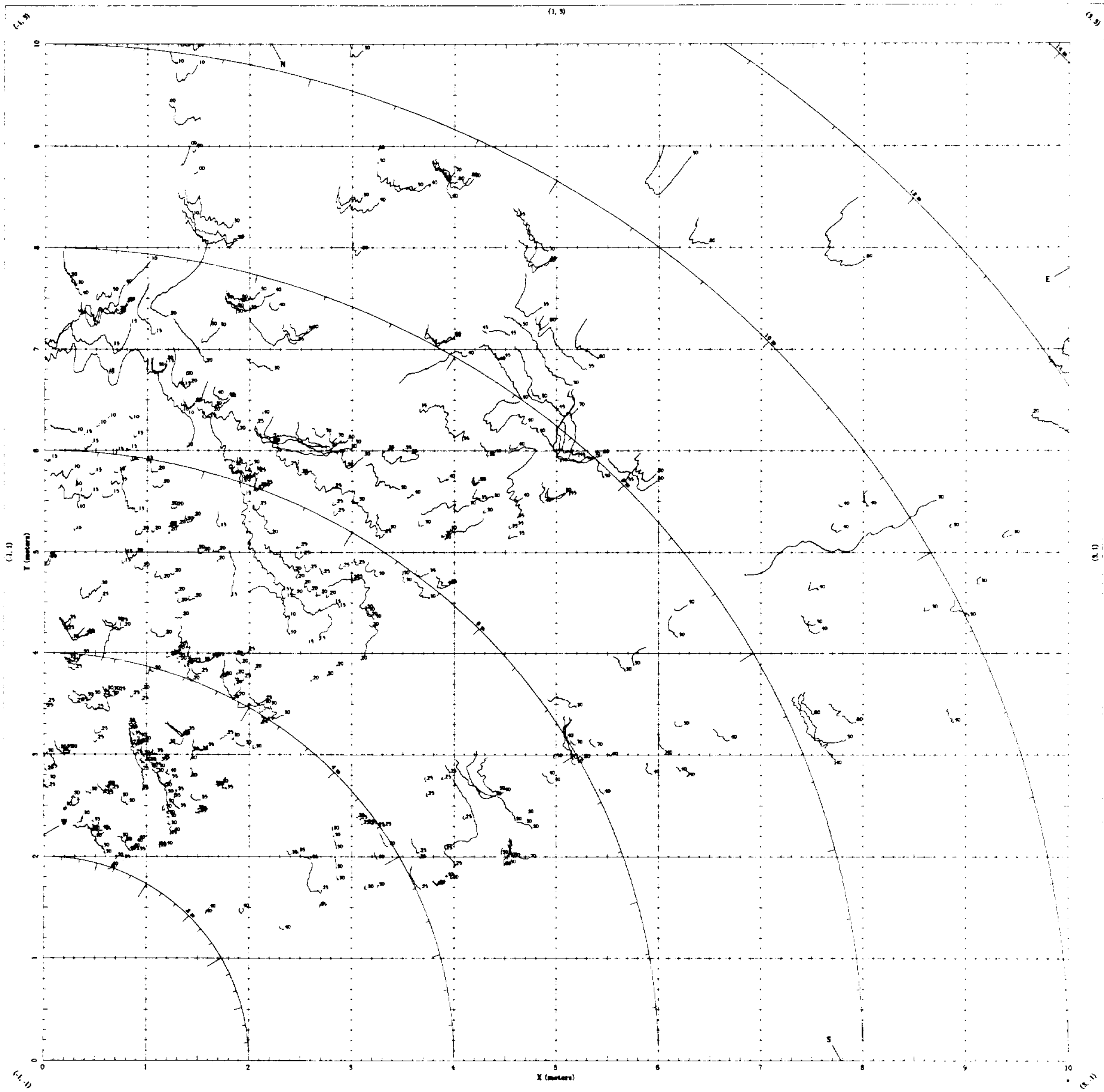
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7338.

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (1, 1)

(Elevations (interval variable) in meters.)

(1, -1)

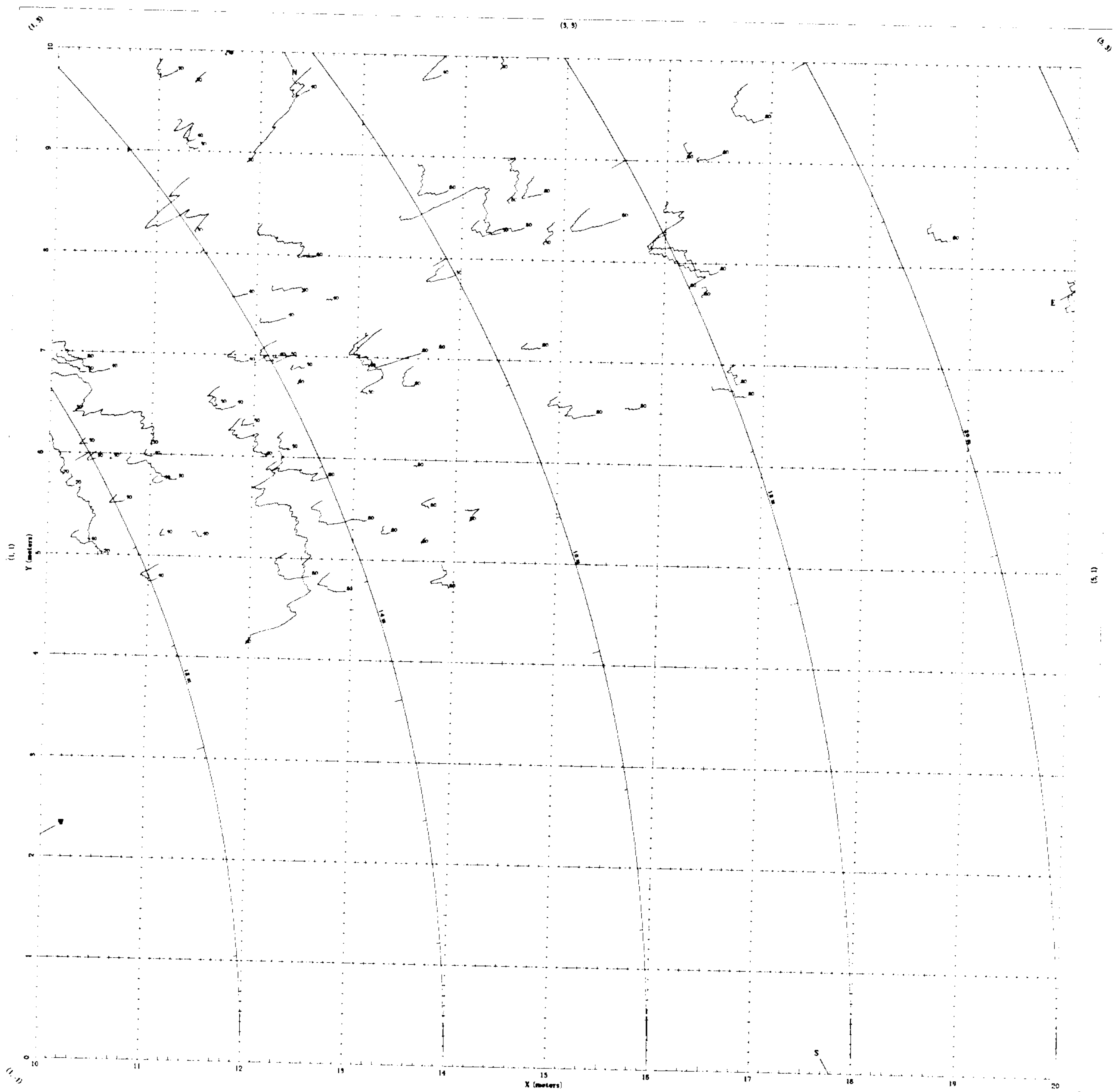
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract NAS1-9682 and JPL 955749 and grant NSG 7118.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 20 SHEET (3, 1)

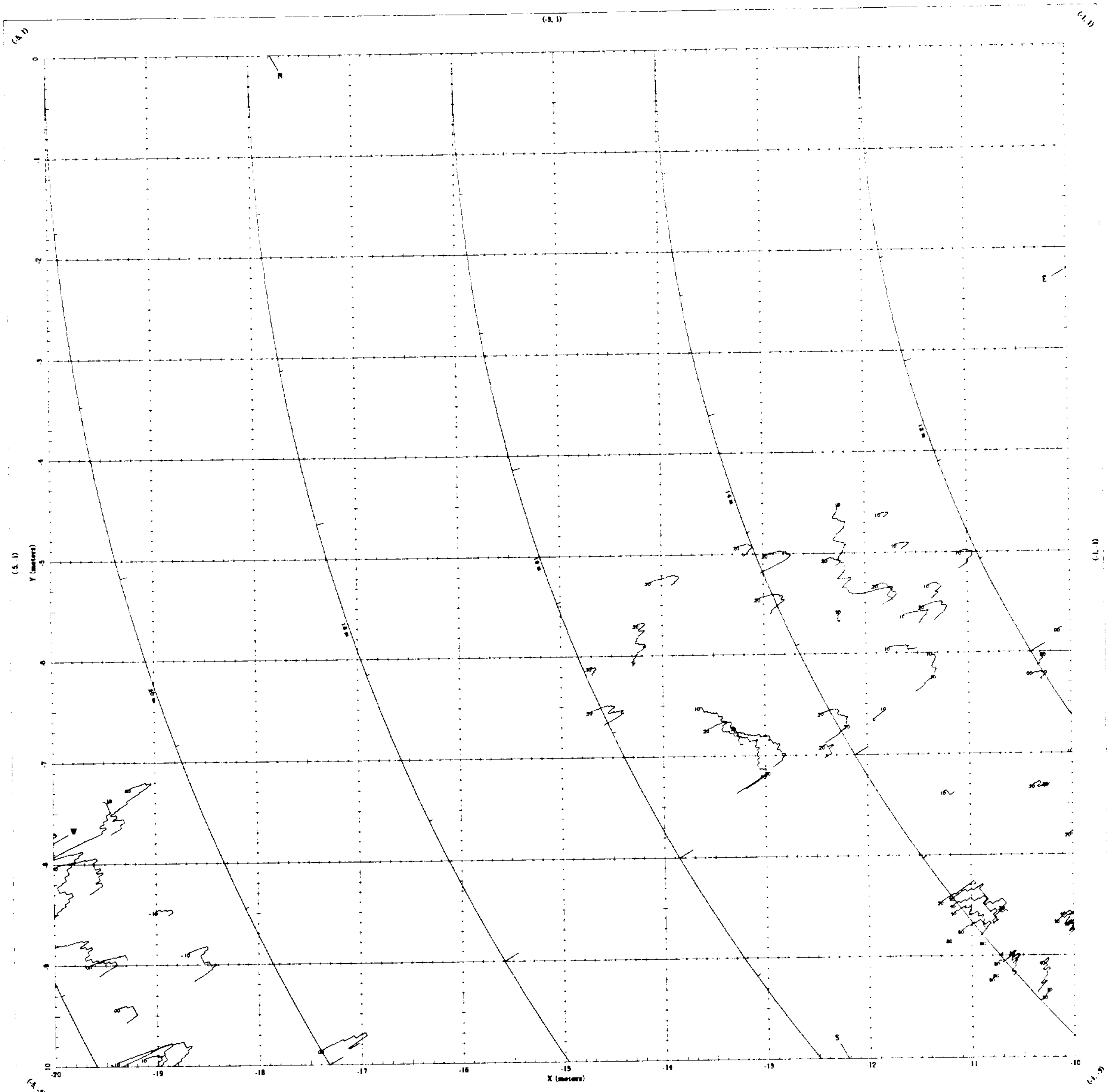
(Elevations (interval variable) in meters.)

(3, -1)

Range Data Set Files

JPL:	Stanford:
L2.ROSC.FRONT	L2CFP
L2.ROSC.FRONT2	L2CFP2
L2.ROSC.EDR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract [illegible] and JPL [illegible] and grant [illegible]



VIKING LANDER 2

SCALE 1 : 20 SHEET (-3, -1)

(Elevations (interval variable) in meters.)

(-3, -5)

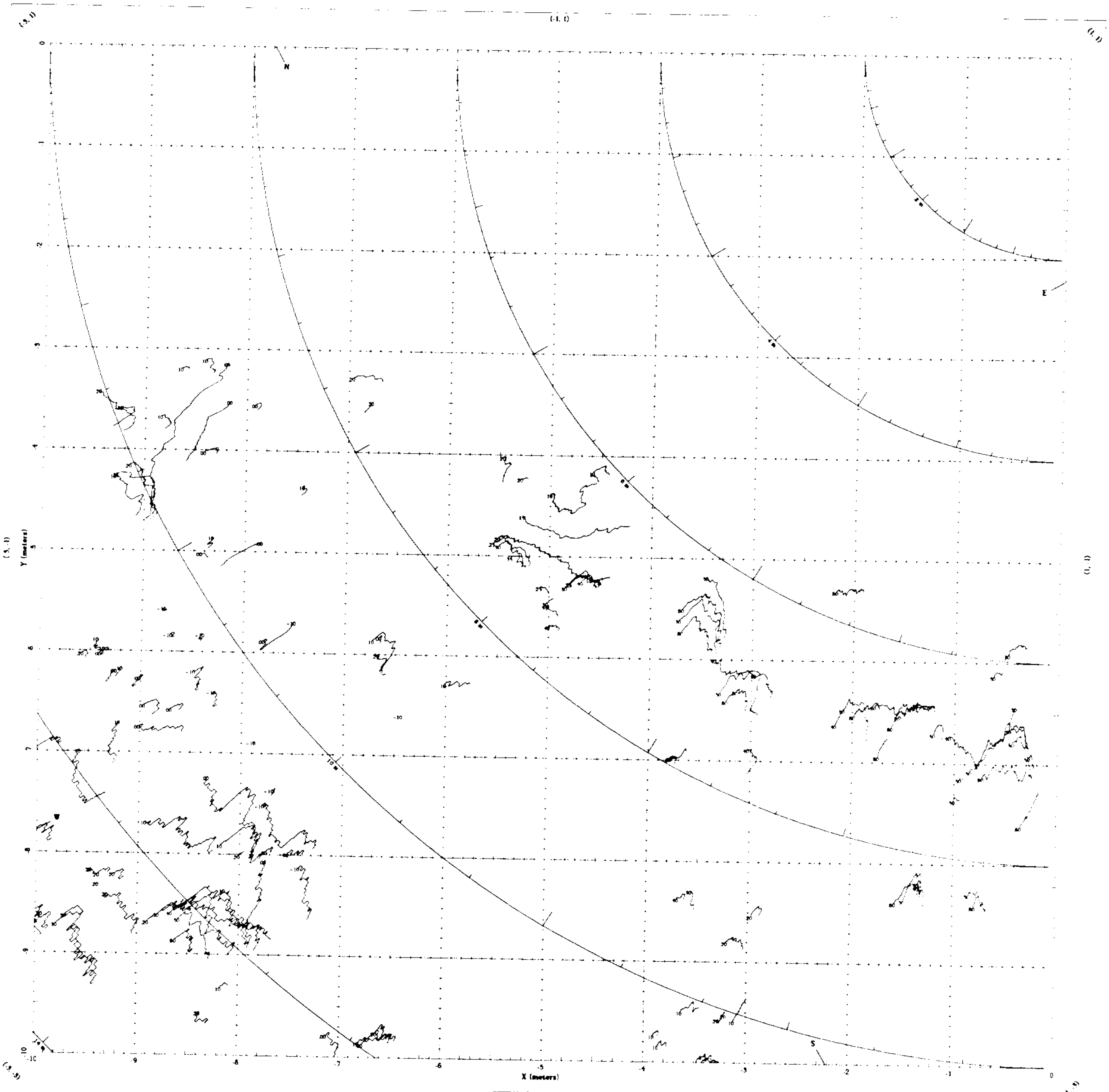
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by [illegible] utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249, and grant NSC 7138 [illegible]

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 20 SHEET (-1, -1)

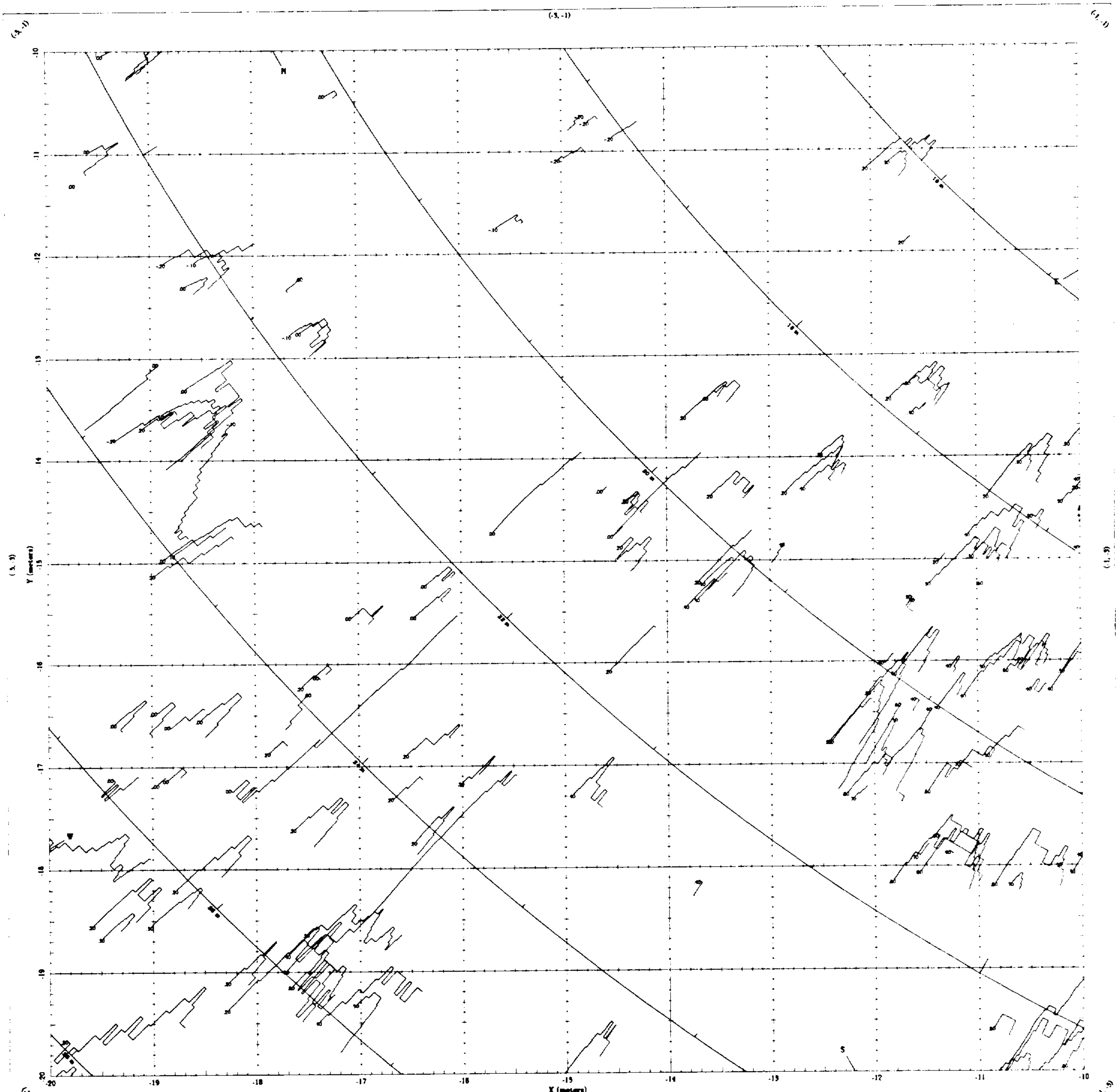
(Elevations (interval variable) in meters.)

Range Data Set Files

JPL:	Stanford:
L2.RDSC FRONT	L2CFP
L2.RDSC FRONT2	L2CFP2
L2.RDSC EDR.FRONT	L2CFA
L2.RDSC BACK	L2CBP
L2.RDSC EDR.BACK	L2CBA

These maps were produced by S. Liebes, ... of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts ... and grant ...

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (-3, -3)

(Elevations (interval variable) in meters.)

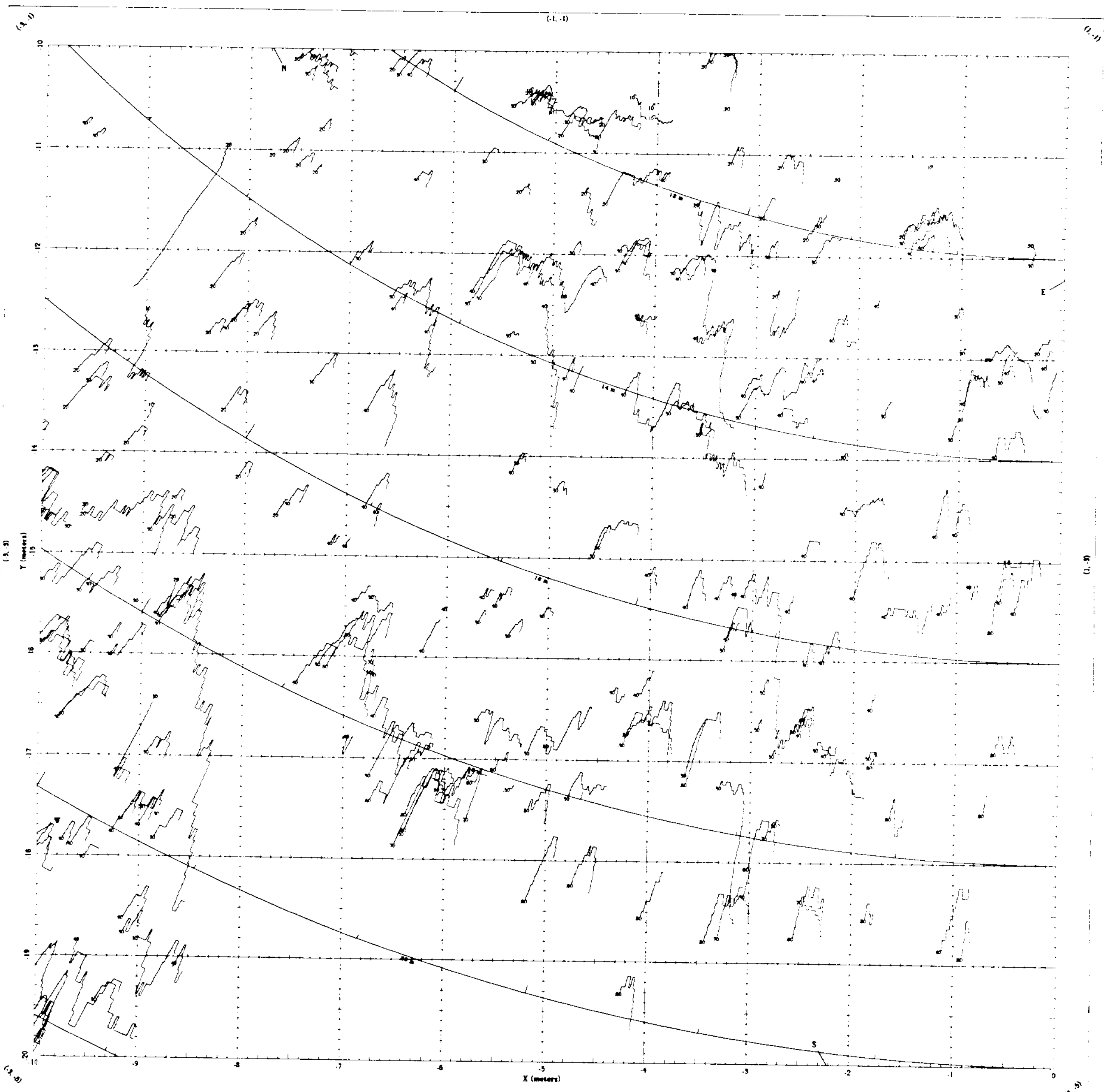
(-3, -5)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 20.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files	
JPL:	Stanford:
L2.ROSC.FRONT	L2CFP
L2.ROSC.FRONT2	L2CFP2
L2.ROSC.EDR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 20 SHEET (-1, -3)

(Elevations (interval variable) in meters.)

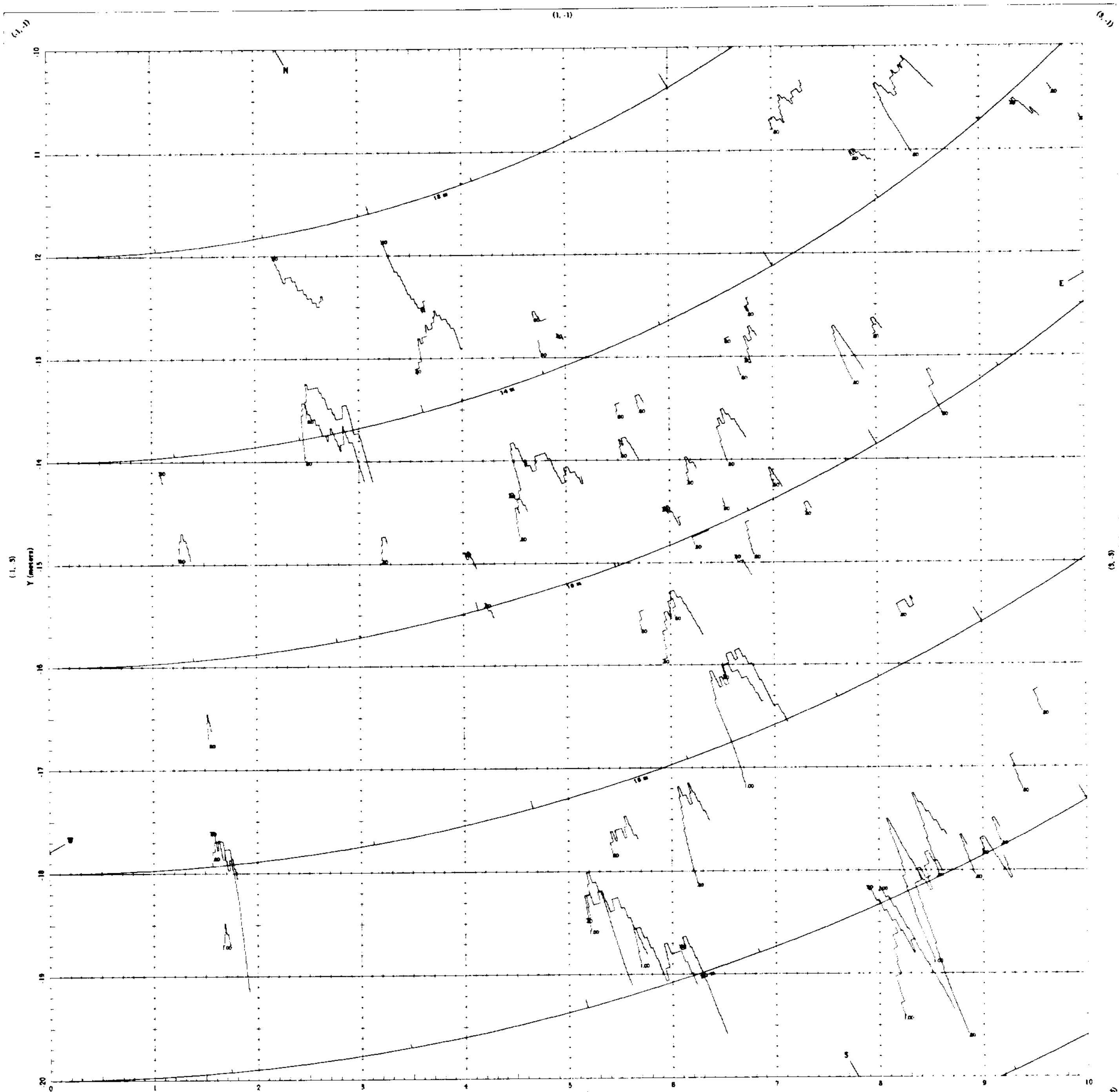
(-1, -5)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7314.

[illegible] OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20   SHEET (1, -3)

(Elevations (interval variable) in meters.)

(1, -5)

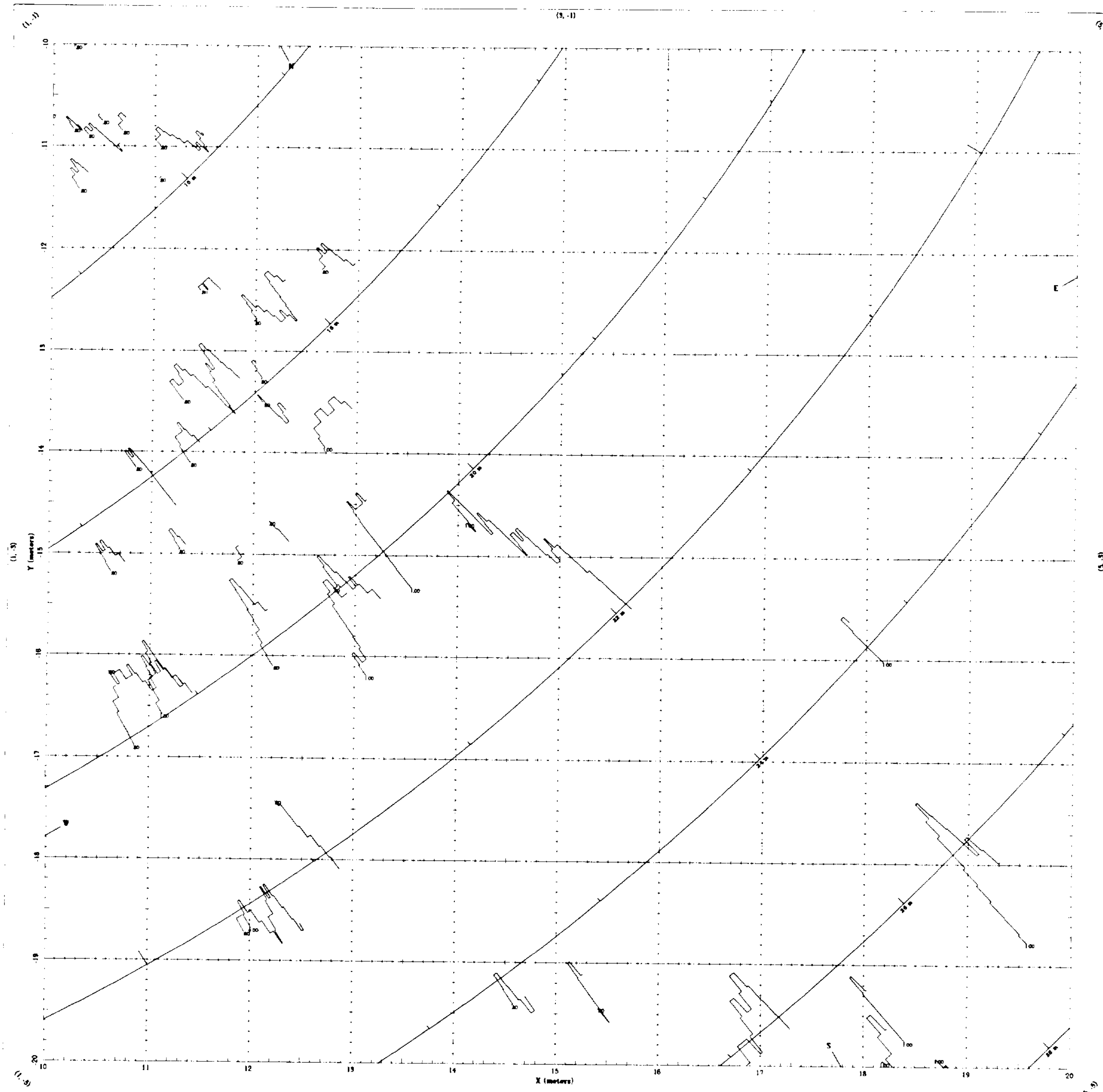
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts N 451-4681 and JPL 953249, and grant NSG 7510.

[illegible]   OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 20 SHEET (3, -3)

(Elevations (interval variable) in meters.)

(3, -5)

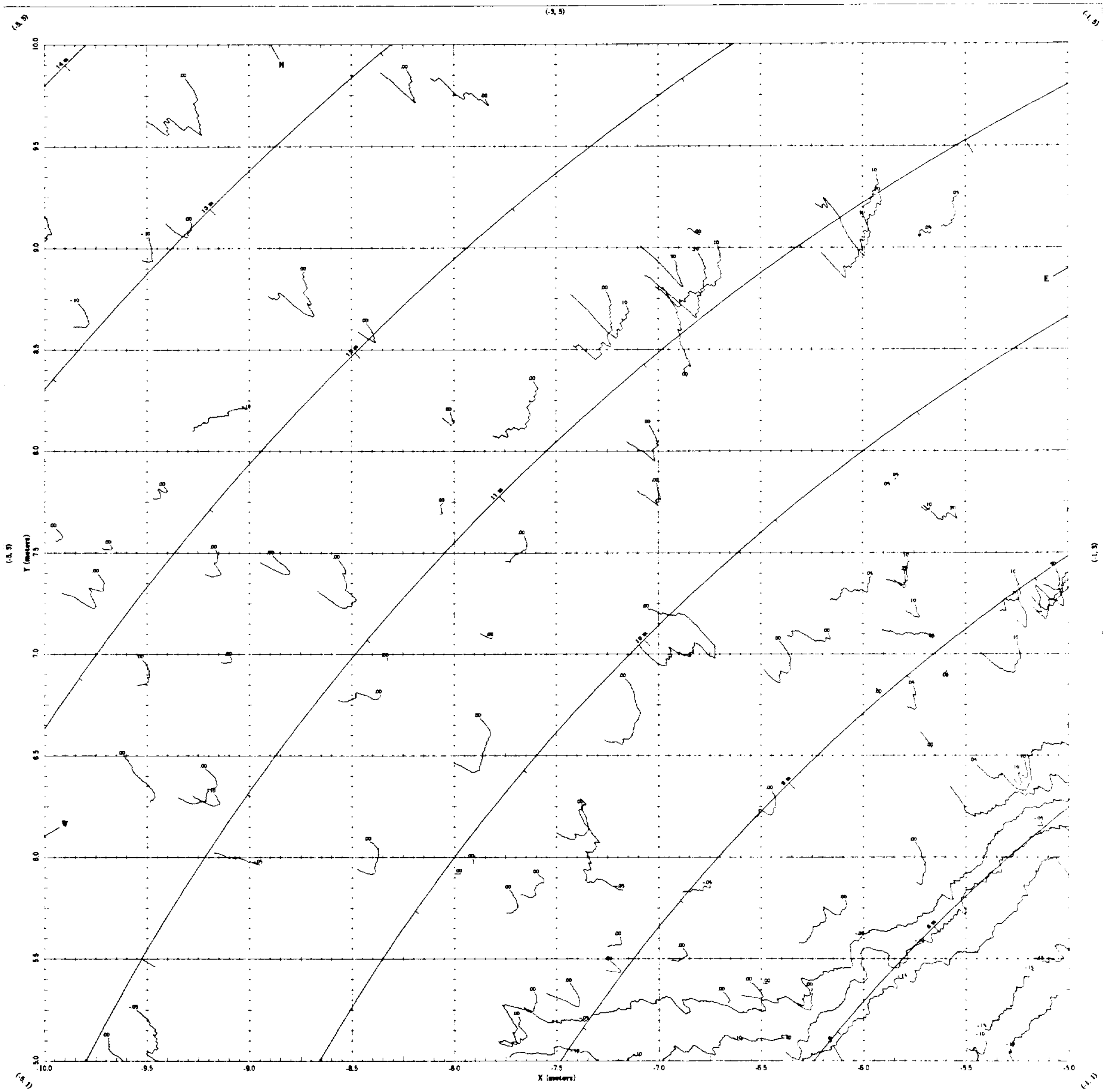
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.RDSC FRONT	L2CFP
L2.RDSC FRONT2	L2CFP2
L2.RDSC EDR FRONT	L2CFA
L2.RDSC BACK	L2CBP
L2.RDSC EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing facilities of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory under contracts [illegible] and JPL [illegible], and grant NSG [illegible]

[illegible] OCTOBER [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 20.183 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 10 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

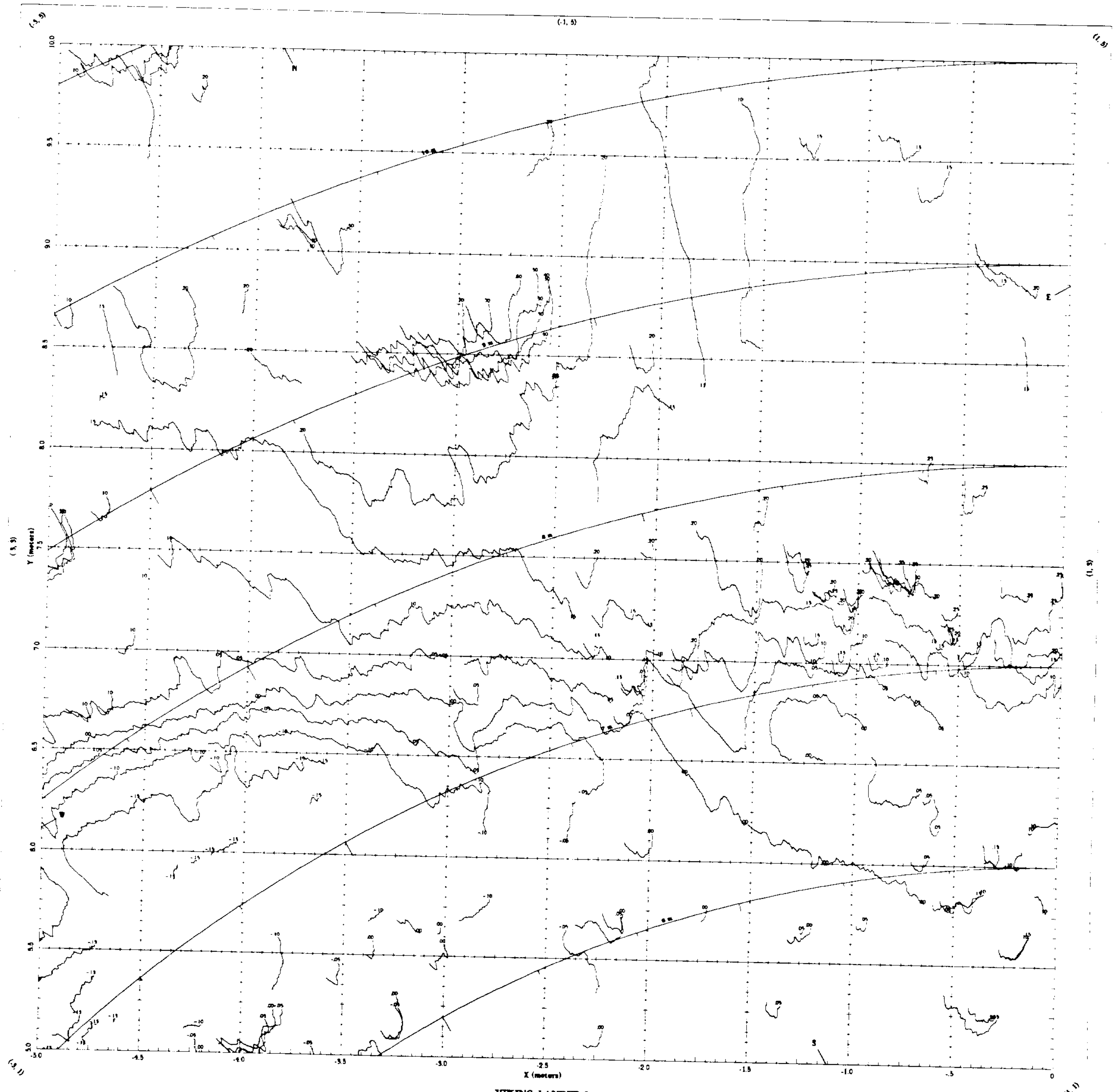
(-3, 1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFF
L2.RDSC.FRONT2	L2CFF2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBF
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9687 and JPL 955149 and grant NSG 7338.

[illegible] [illegible] 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis

VIKING LANDER 2

SCALE 1 : 10 SHEET (-1, 3)

(Elevations (interval variable) in meters.)

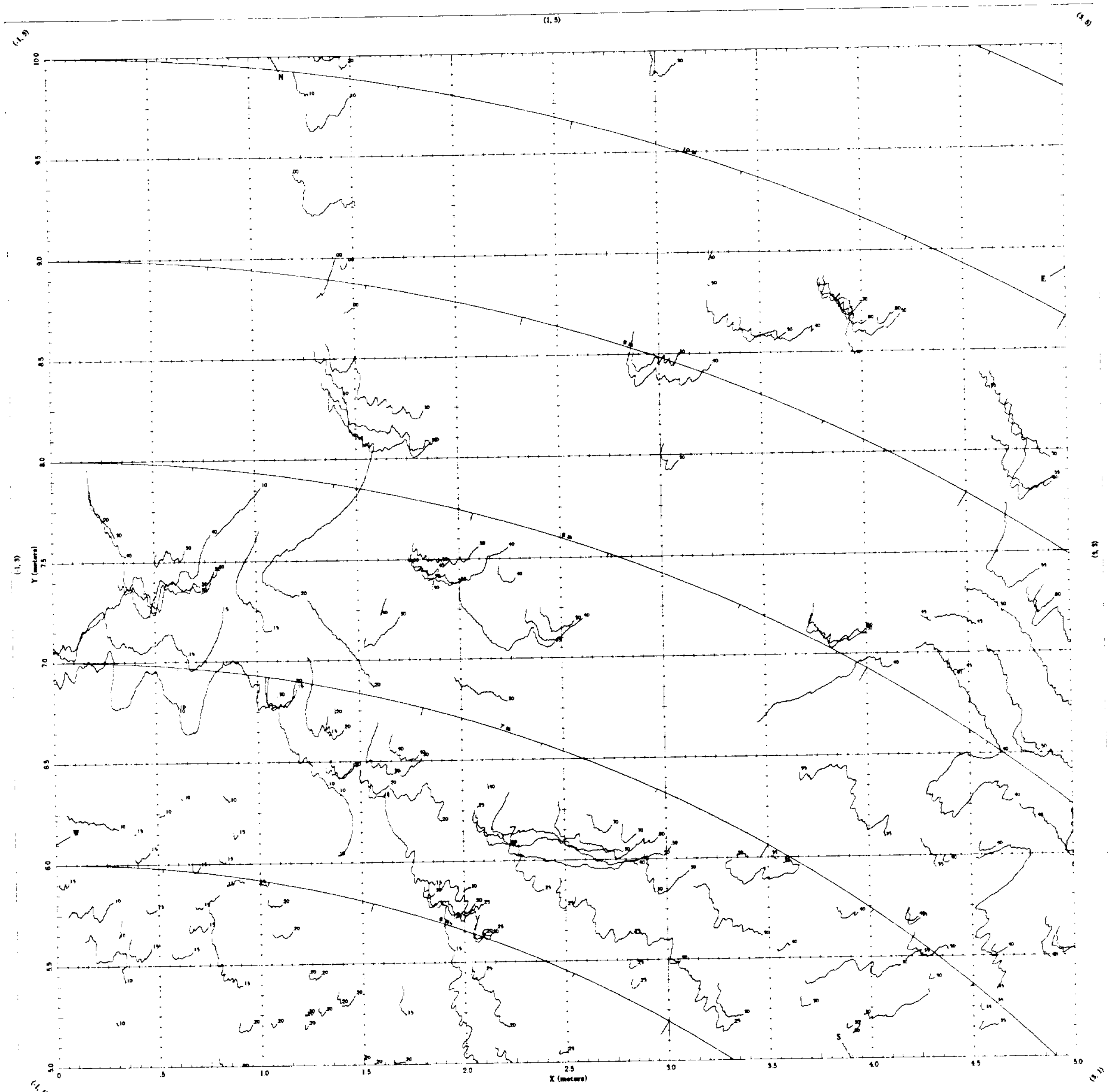
(-1, 1)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7316

10257/0417 OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 10 SHEET (1, 3)

(Elevations (interval variable) in meters.)

(1, 1)

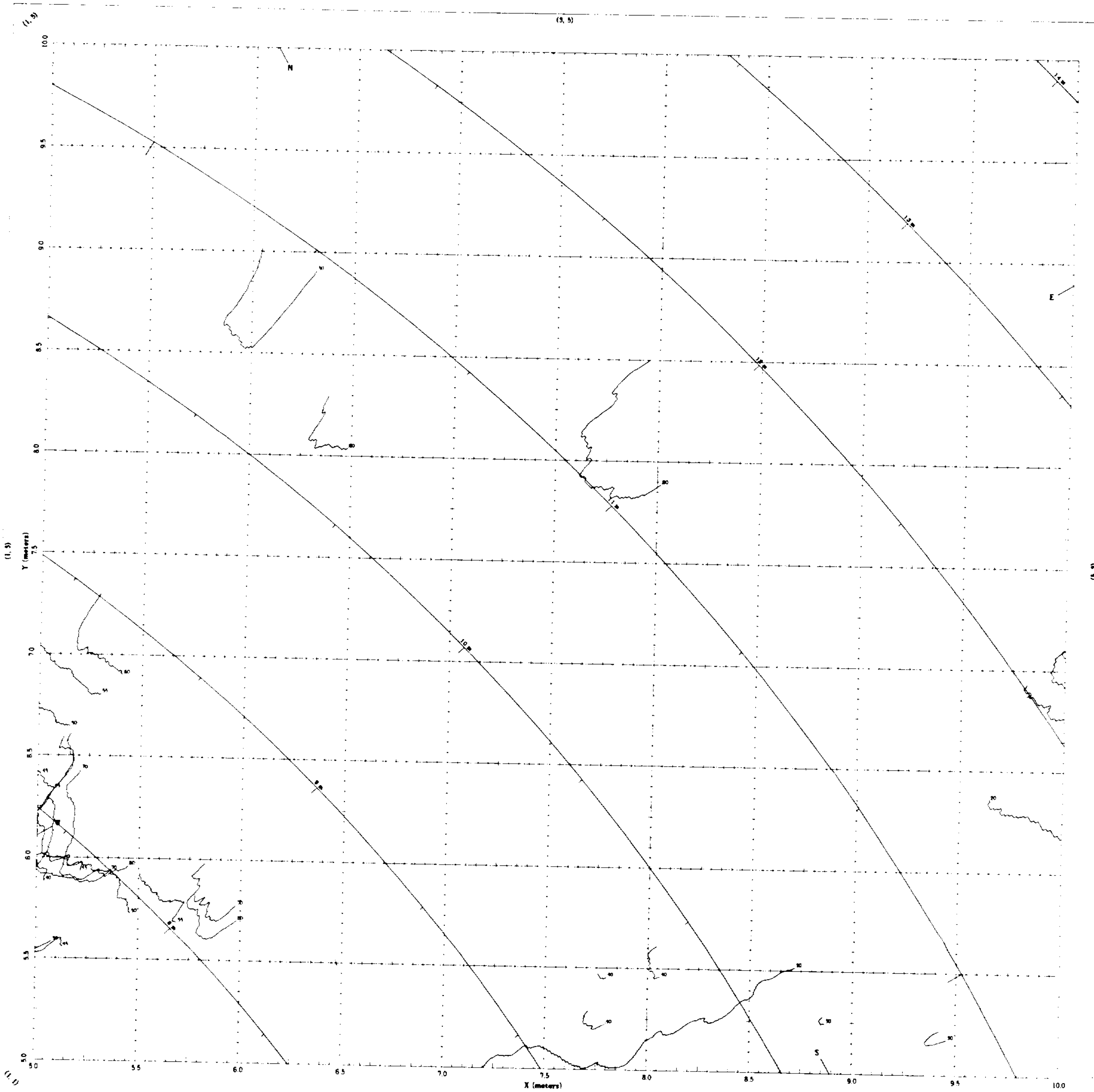
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDA.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 10 SHEET (3, 3)

(Elevations (interval variable) in meters.)

(3, 1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9683 and JPL 953249, and grant NSG-7538.

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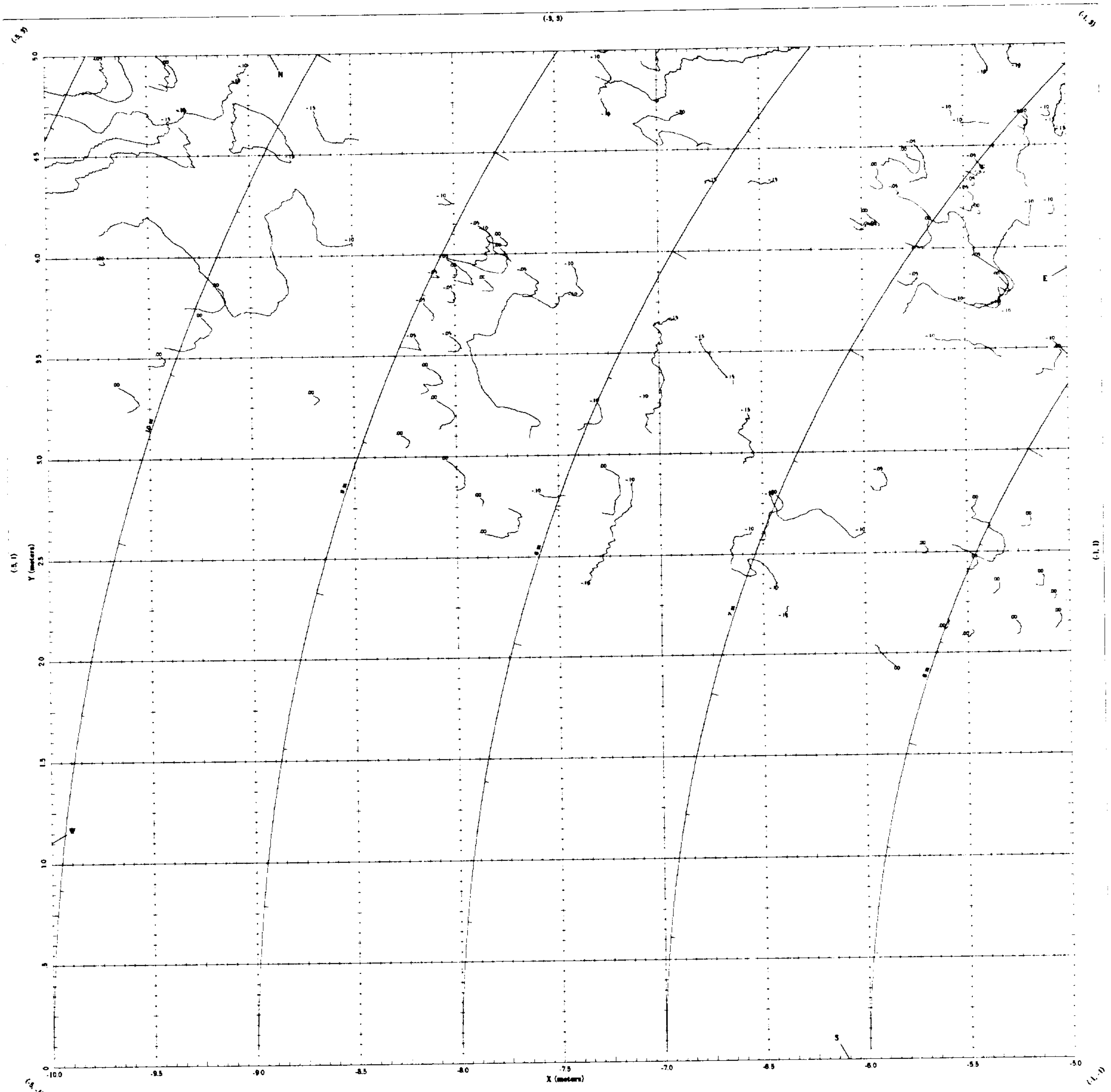


VIKING LANDER 2

SCALE 1 : 10 SHEET (-3, 1)

(Elevations (interval variable) in meters.)

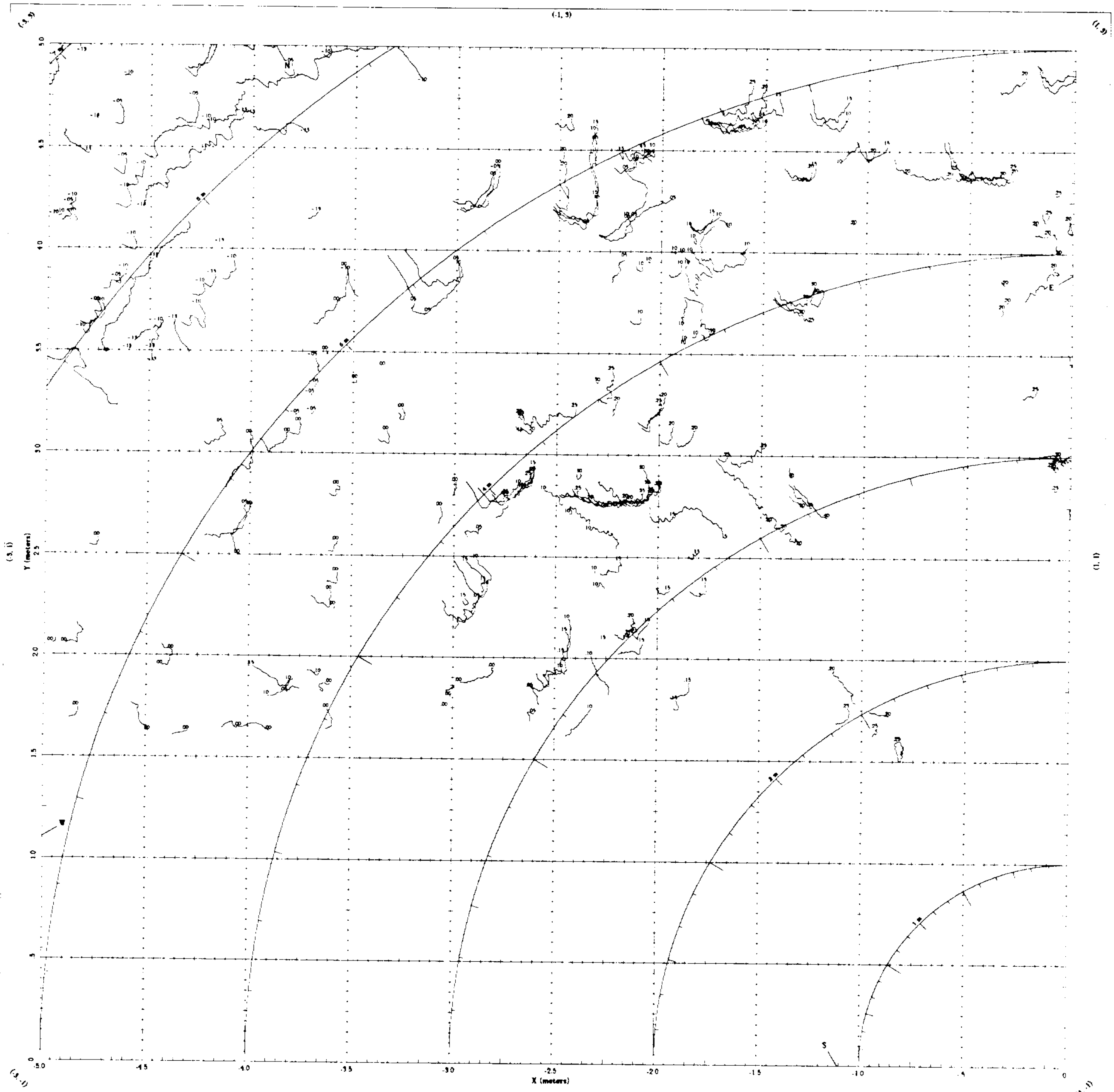
(-3, -1)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.132 degrees CCW from the LGN positive y-axis.

Range Data Set Files	
JPL	Stanford
L2.ROSC.FRONT	L2CFP
L2.ROSC.FRONT2	L2CFP2
L2.ROSC.EDR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7108

10097780497 OCTOBER 1978



VIKING LANDER 2

SCALE 1 : 10 SHEET (-1, 1)

(Elevations (interval variable) in meters.)

(-1, -1)

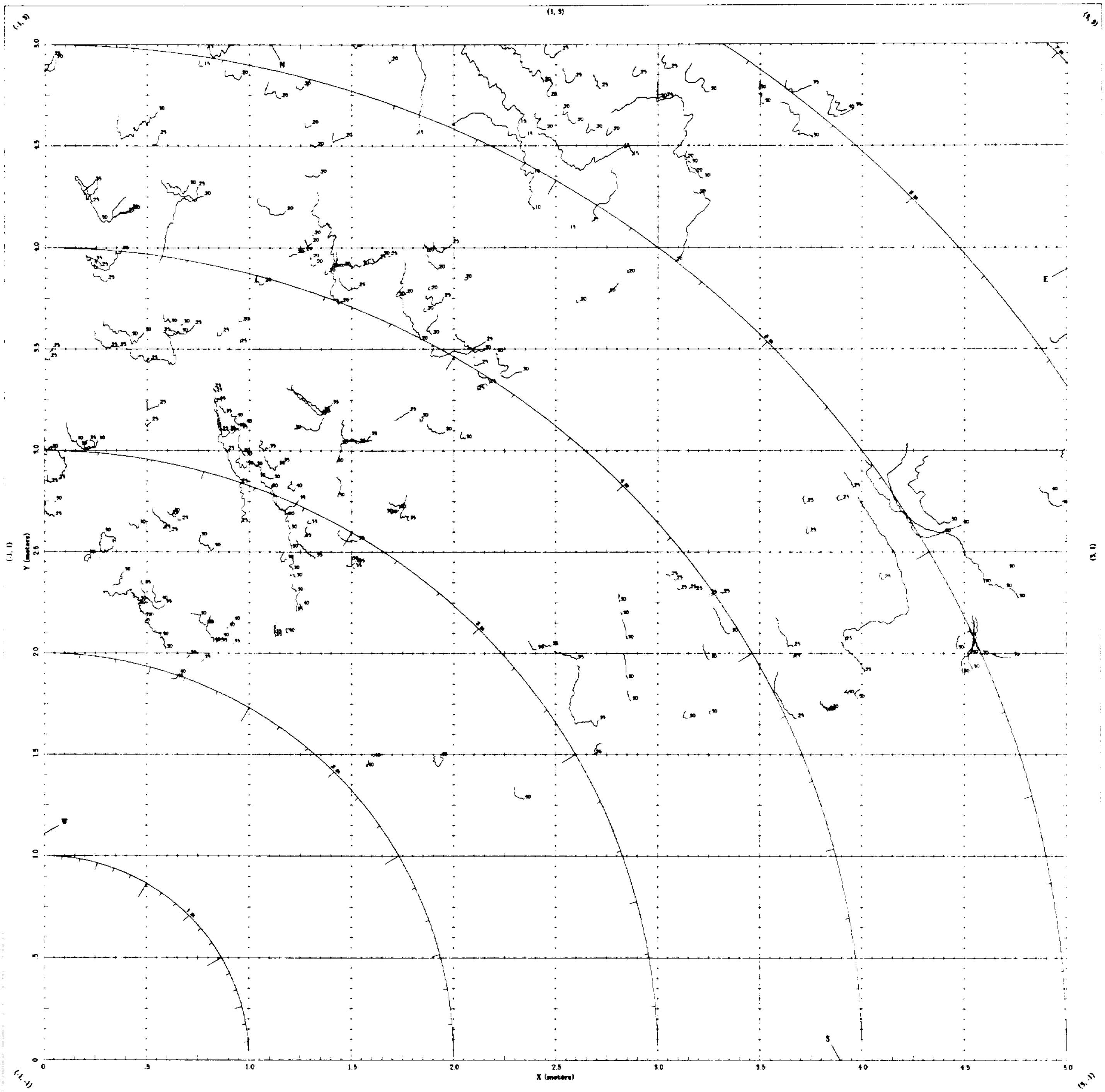
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7318.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 25.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 10 SHEET (1, 1)

(Elevations (interval variable) in meters.)

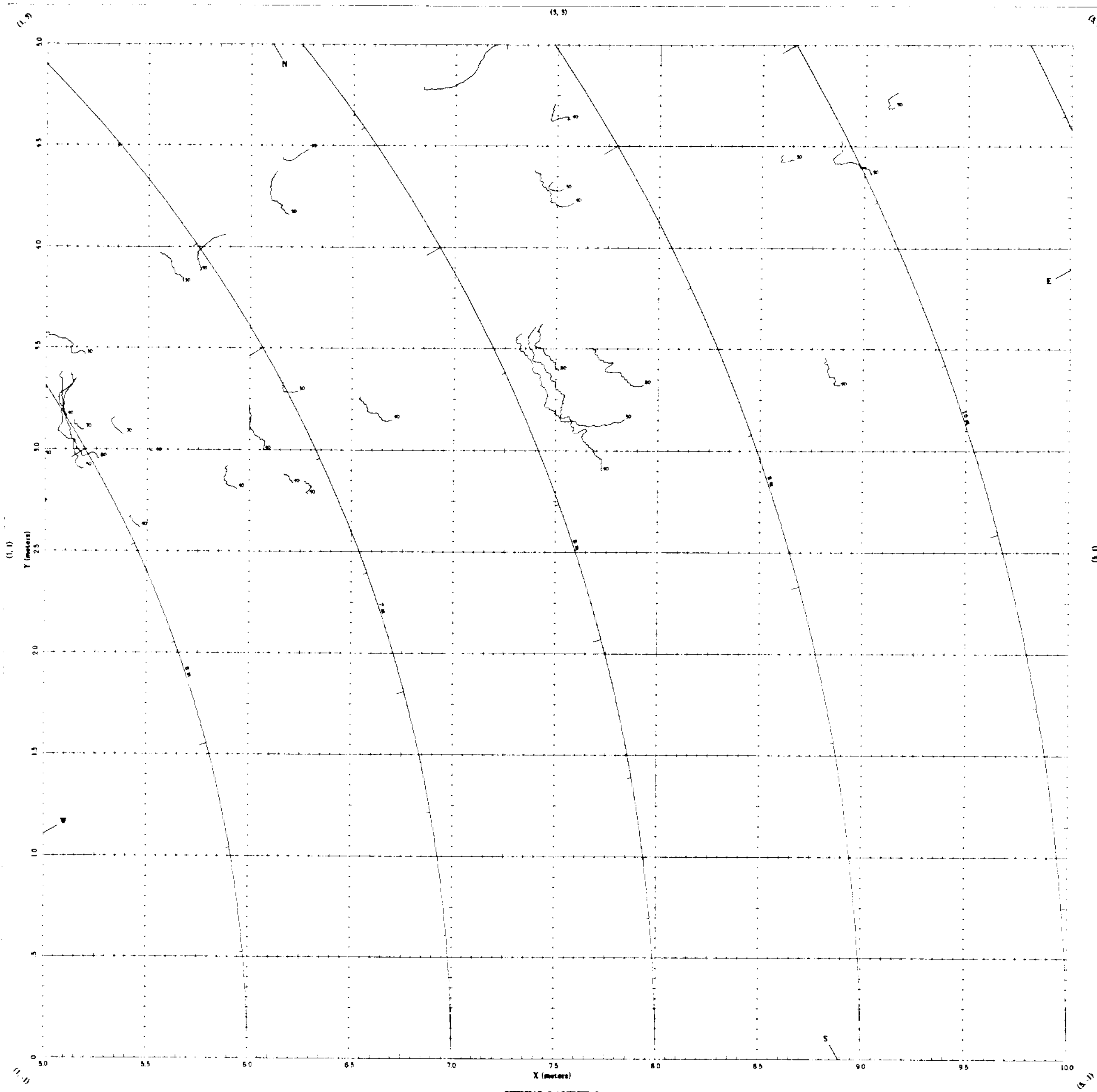
(1, -1)

Range Data Set Files

JPL:	Stanford:
L2.ADSC.FRONT	L2CFP
L2.ADSC.FRONT2	L2CFP2
L2.ADSC.EDR.FRONT	L2CFA
L2.ADSC.BACK	L2CBP
L2.ADSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract: NAS1-9682 and JPL 955349, and grant NSG-1519

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 10 SHEET (3, 1)

(Elevations (internal variable) in meters.)

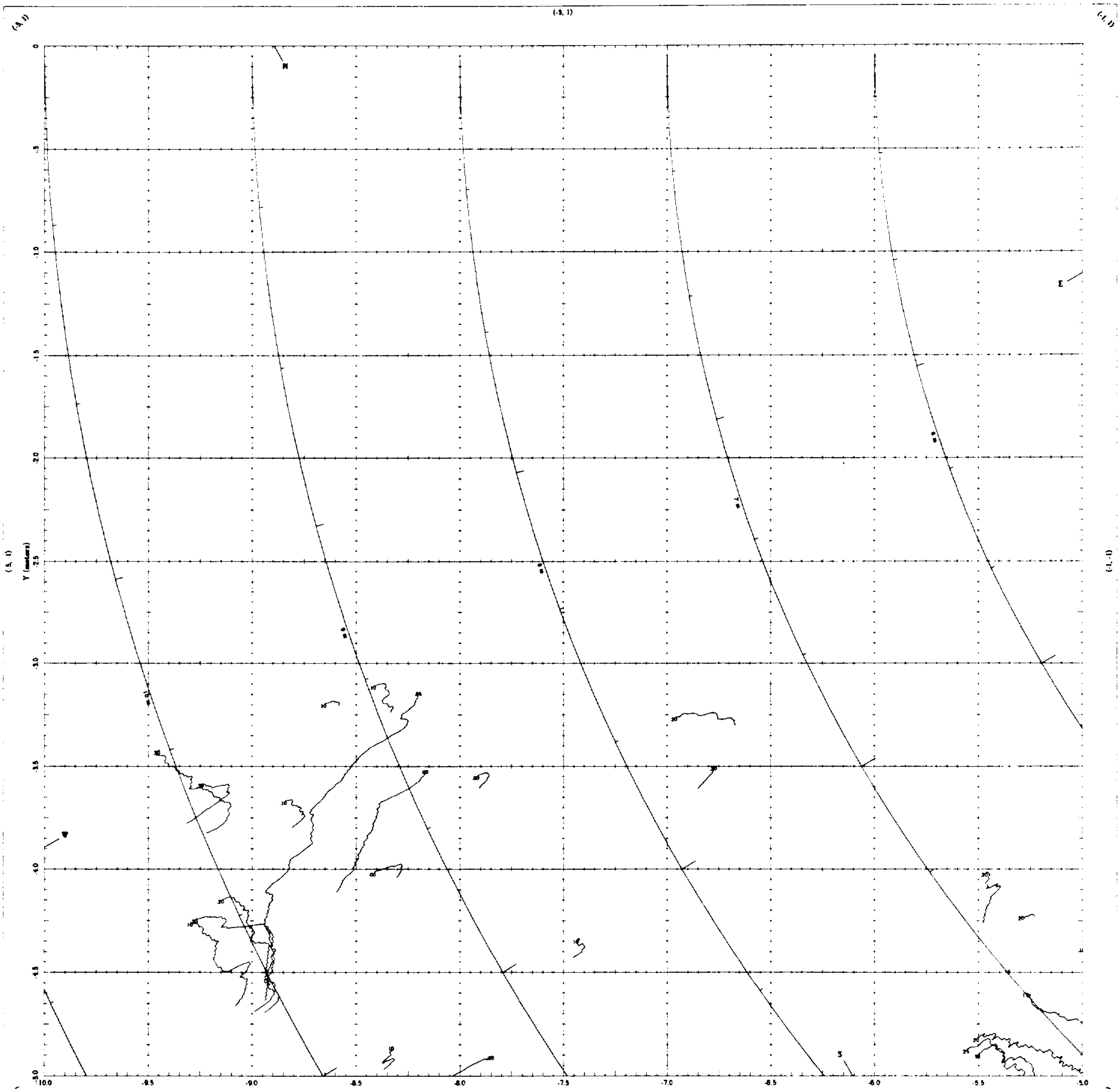
(3, -1)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EOR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EOR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7538.

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 10 SHEET (-3, -1)

(Elevations (interval variable) in meters.)

(-3, -3)

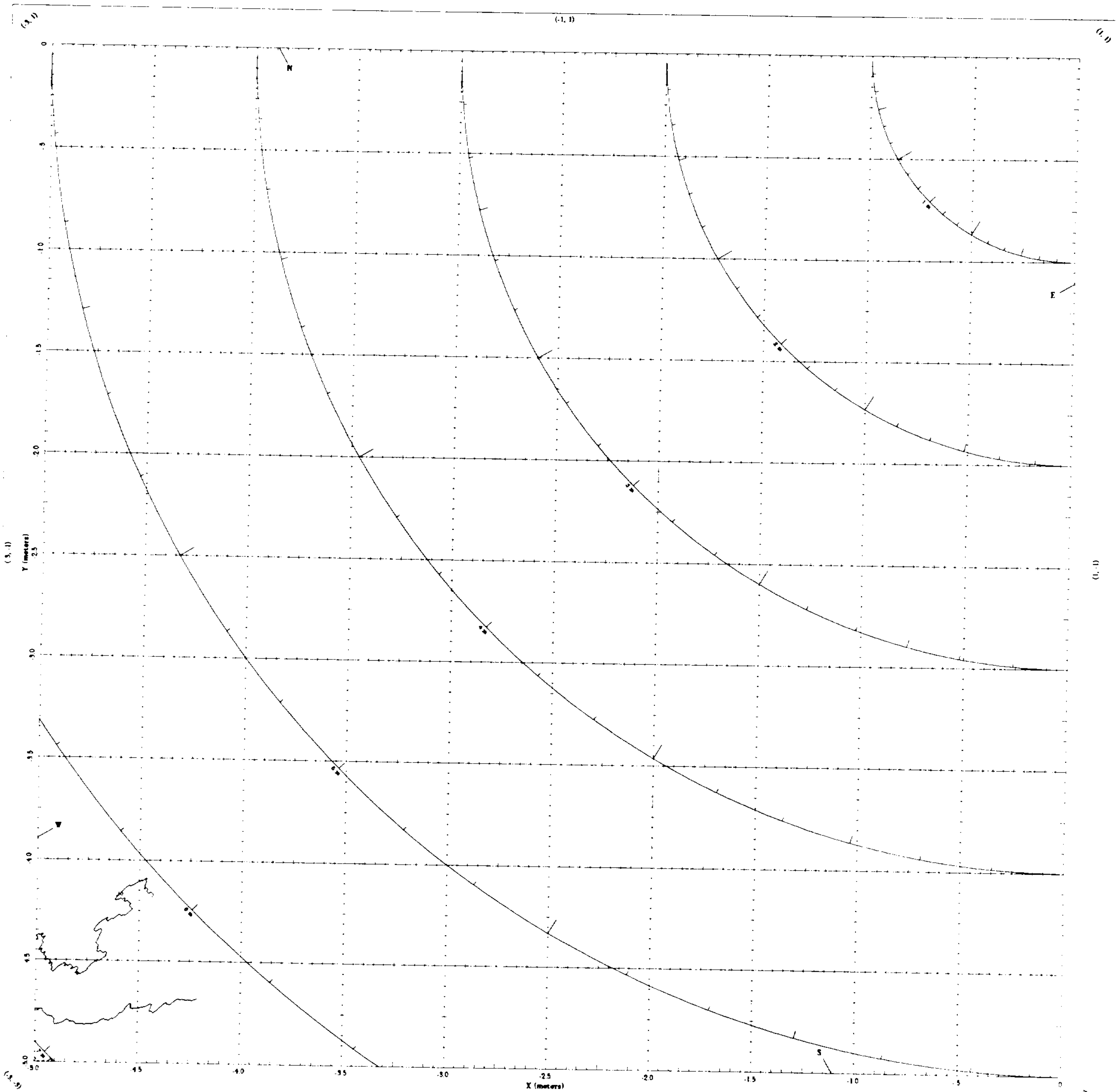
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 25.132 degrees CCW from the LGN positive y-axis

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by [illegible], utilizing resources of the [illegible] Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL [illegible], and grant [illegible]

[illegible] OCTOBER [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 10 SHEET (-1, -1)

(Elevations (interval variable) in meters.)

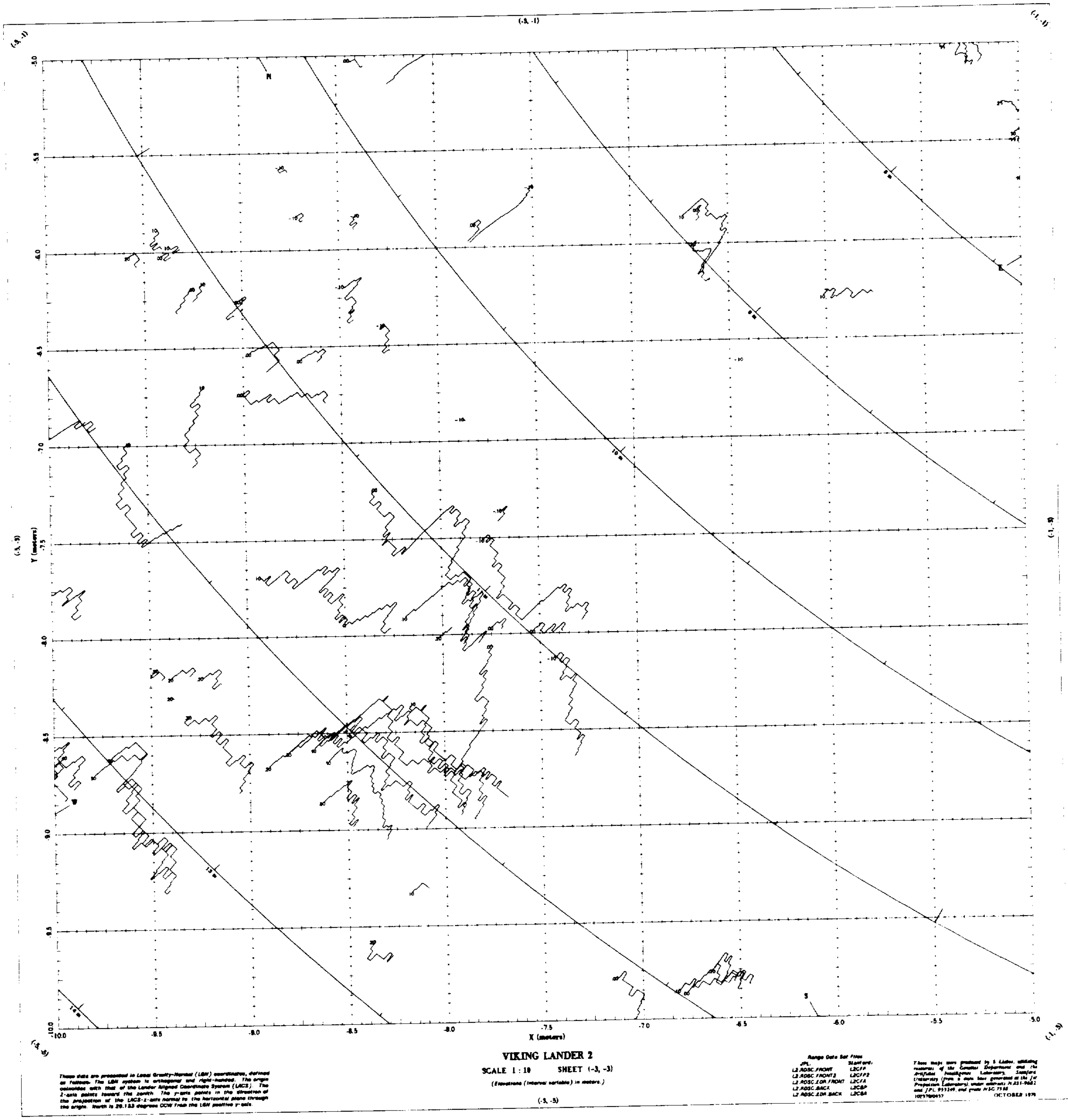
(-1, -3)

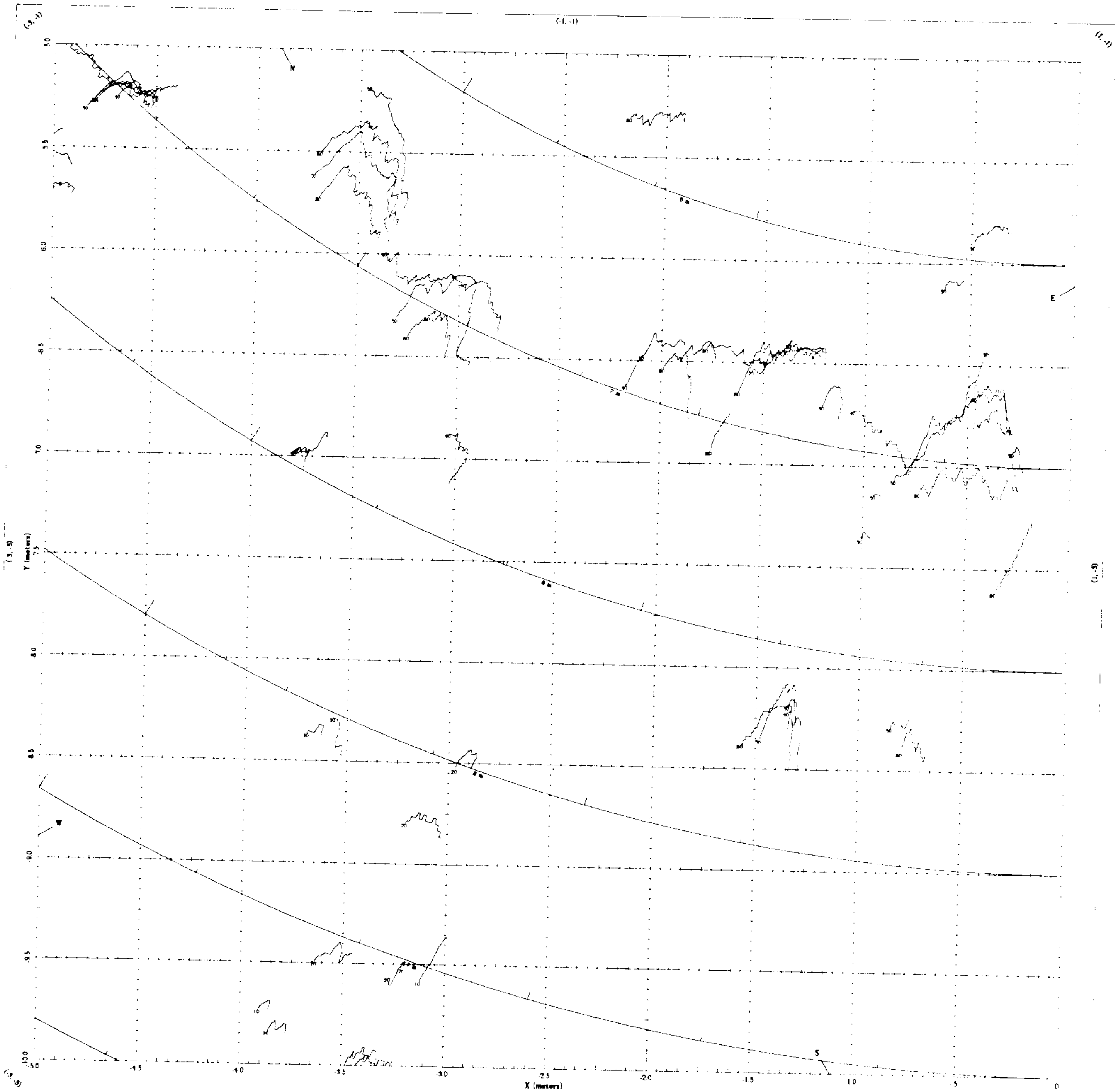
Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953269, and grant NSG 7338.

[illegible] OCTOBER 1979


VIKING LANDER 2
SCALE 1 : 10 SHEET (-3, -3)
(Elevations (interval variable) in meters.)
(-3, -5)
(-3, -1)
(1, -1)
(1, -5)
(-3, -5)
X (meters)
Y (meters)
Range Data Set Files
JPL Stanford
L2.RDSC.FRONT L2CFF
L2.RDSC.FRONT2 L2CFF2
L2.RDSC.EDR.FRONT L2CFA
L2.RDSC.BACK L2CBP
L2.RDSC.EDR.BACK L2CBA
OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 18 SHEET (-1, -3)

(Elevations (interval variable) in meters.)

(-1, -5)

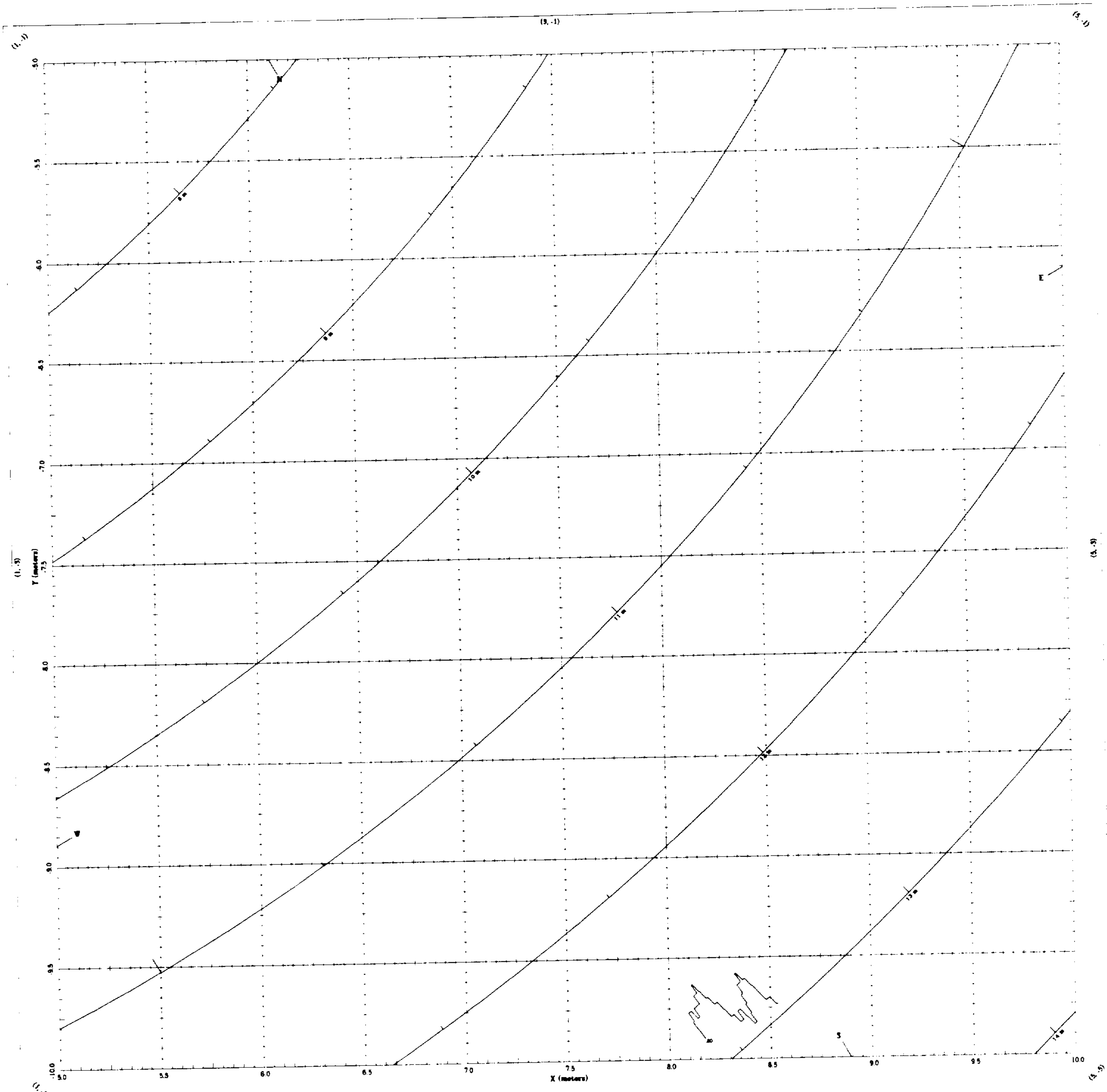
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249 and grant NSG 7338.

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 10 SHEET (3, -3)

(Elevations (interval variable) in meters.)

(3, -5)

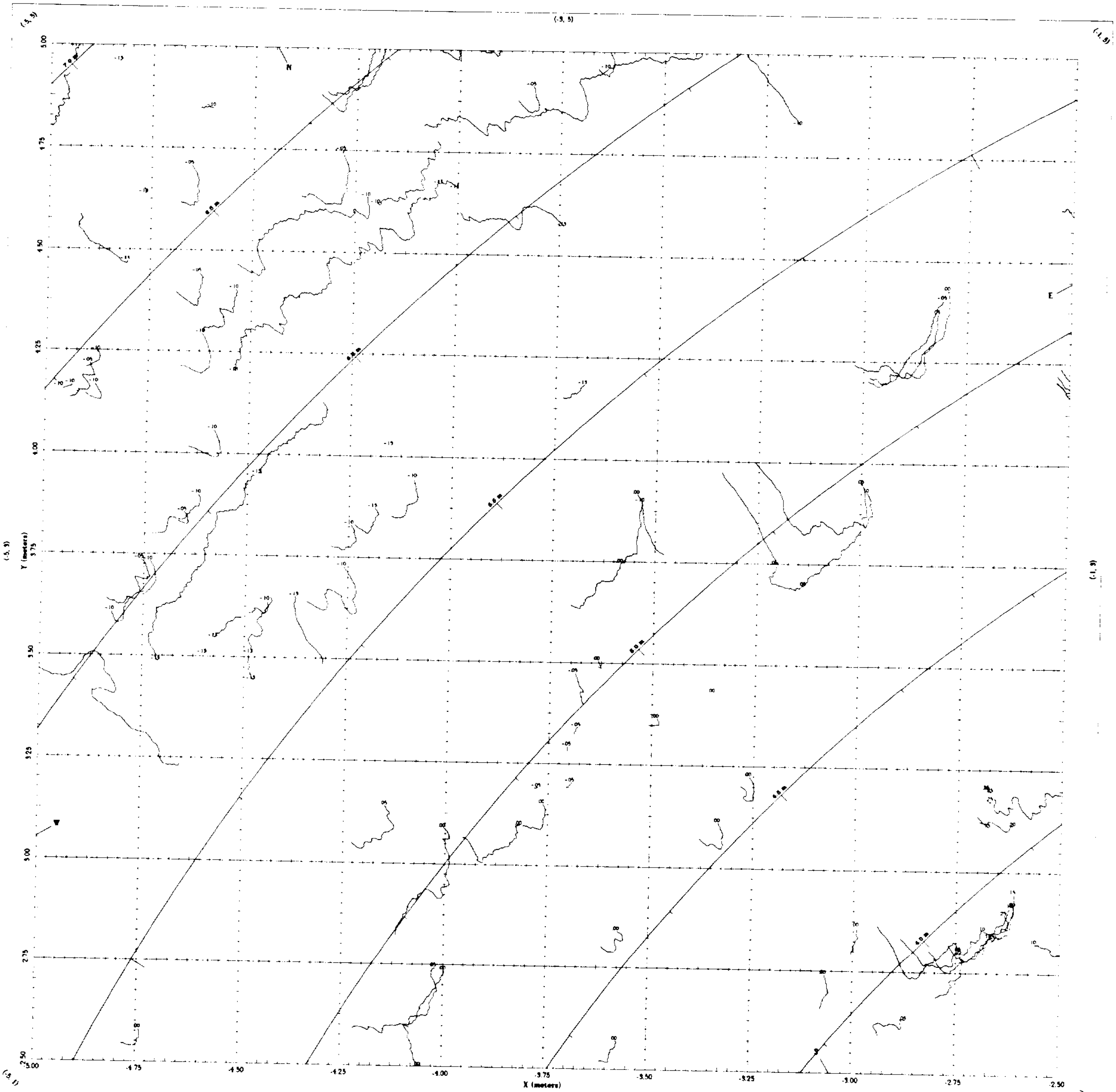
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 28.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL:	Stanford:
L2.ROSC.FRONT	L2CFP
L2.ROSC.FRONT2	L2CFP2
L2.ROSC.EDR.FRONT	L2CFA
L2.ROSC.BACK	L2CBP
L2.ROSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 953269, and grant NSG 7158.

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

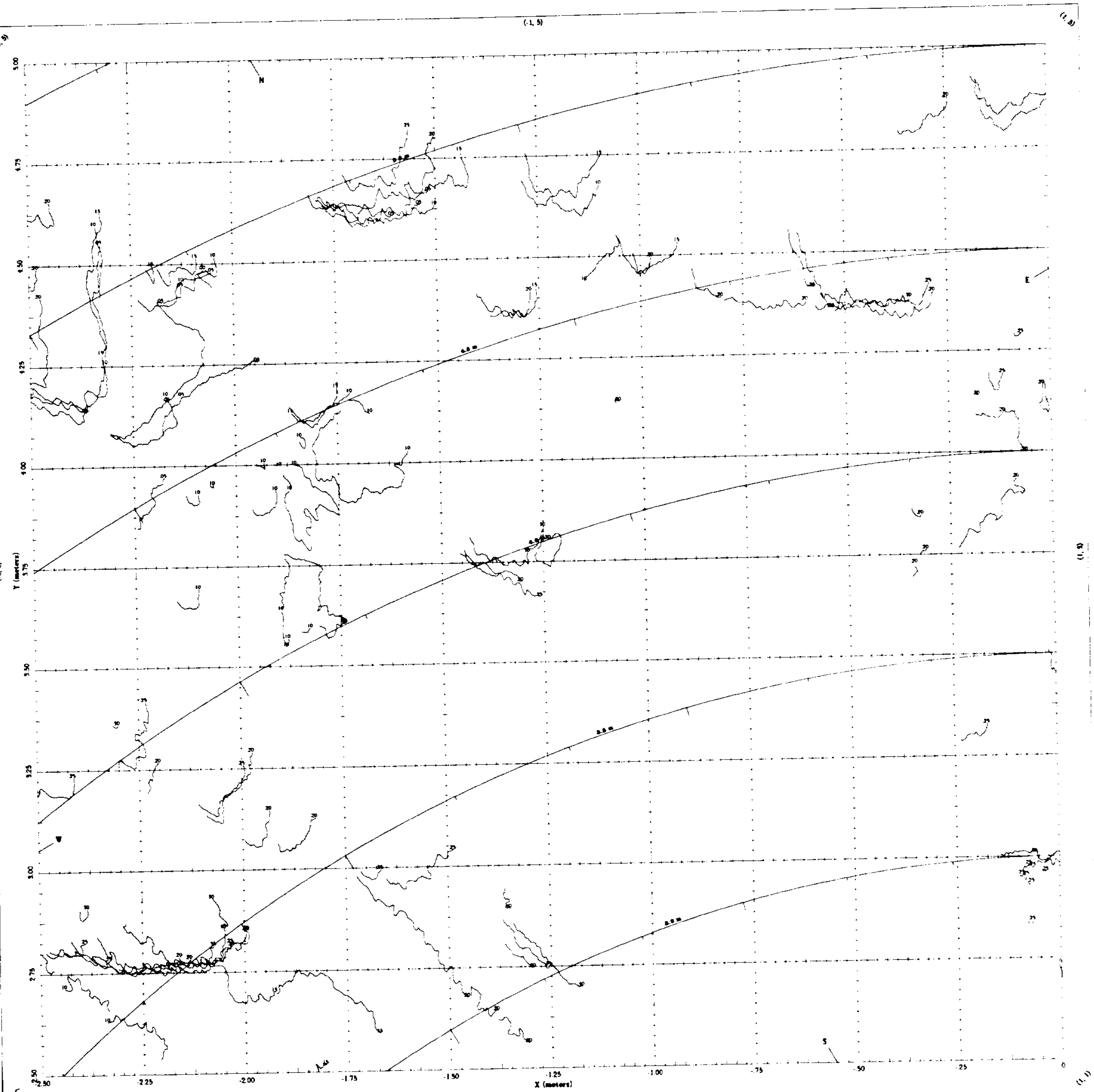
SCALE 1 : 5 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7558
[illegible] OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 5 SHEET (-1, 3)

(Elevations (interval variable) in meters.)

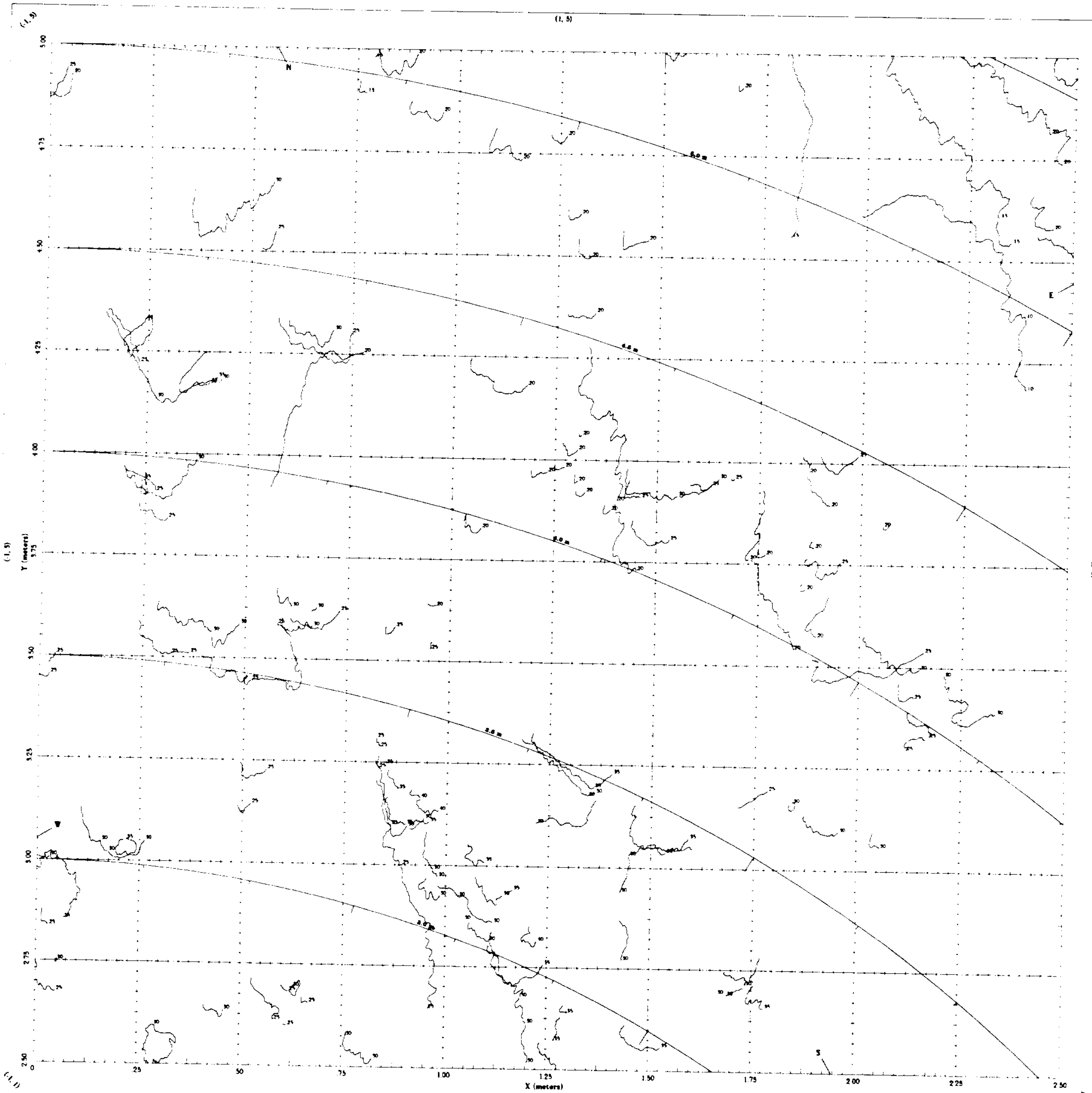
(-1, 1)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.135 degrees CCW from the LGN positive y-axis.

Range Data Set Files	
JPL.	Stanford.
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955149 and grant NSG 7138.

1021790497 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 5 SHEET (1, 3)

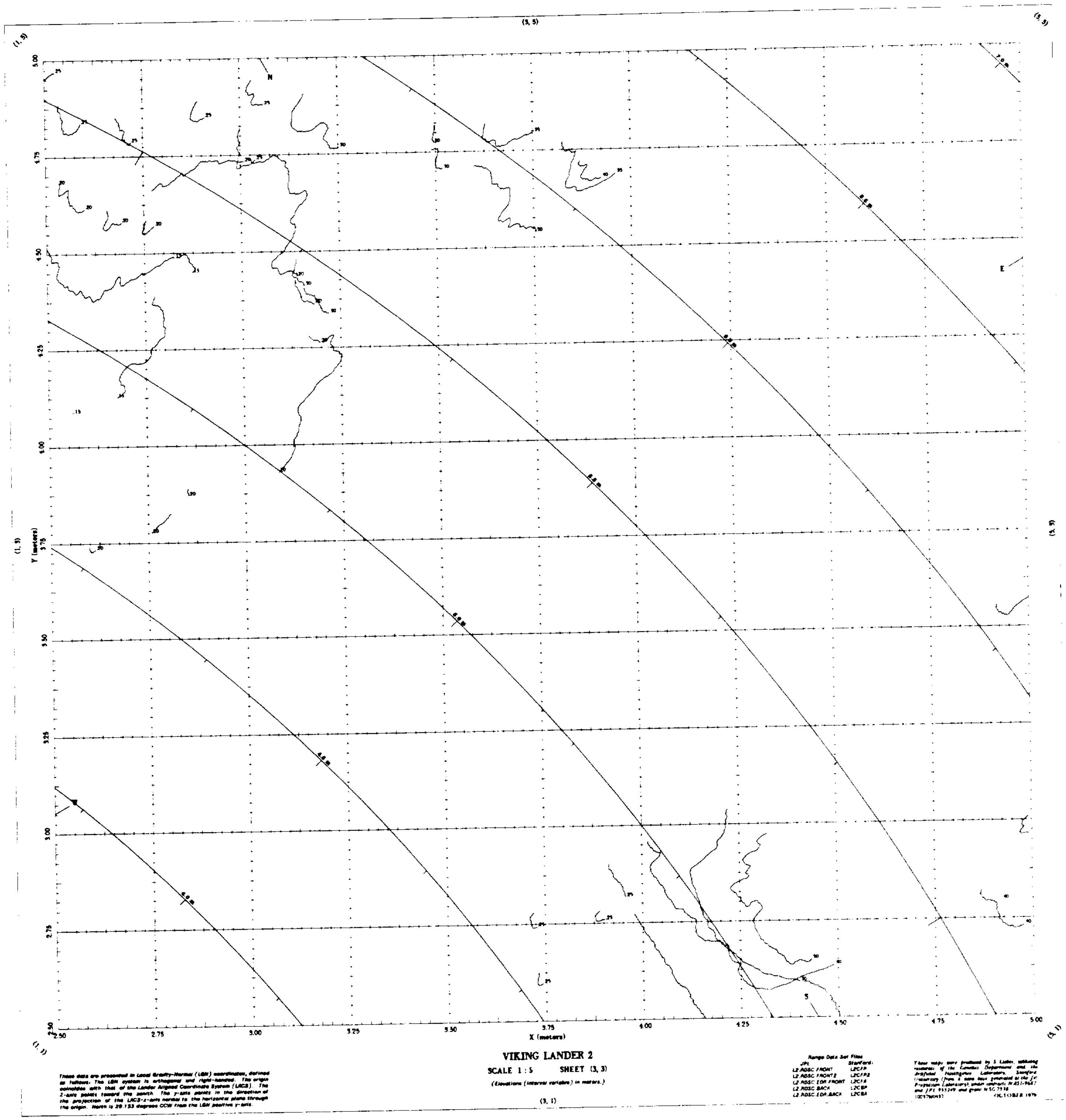
(Elevations (interval variable) in meters.)

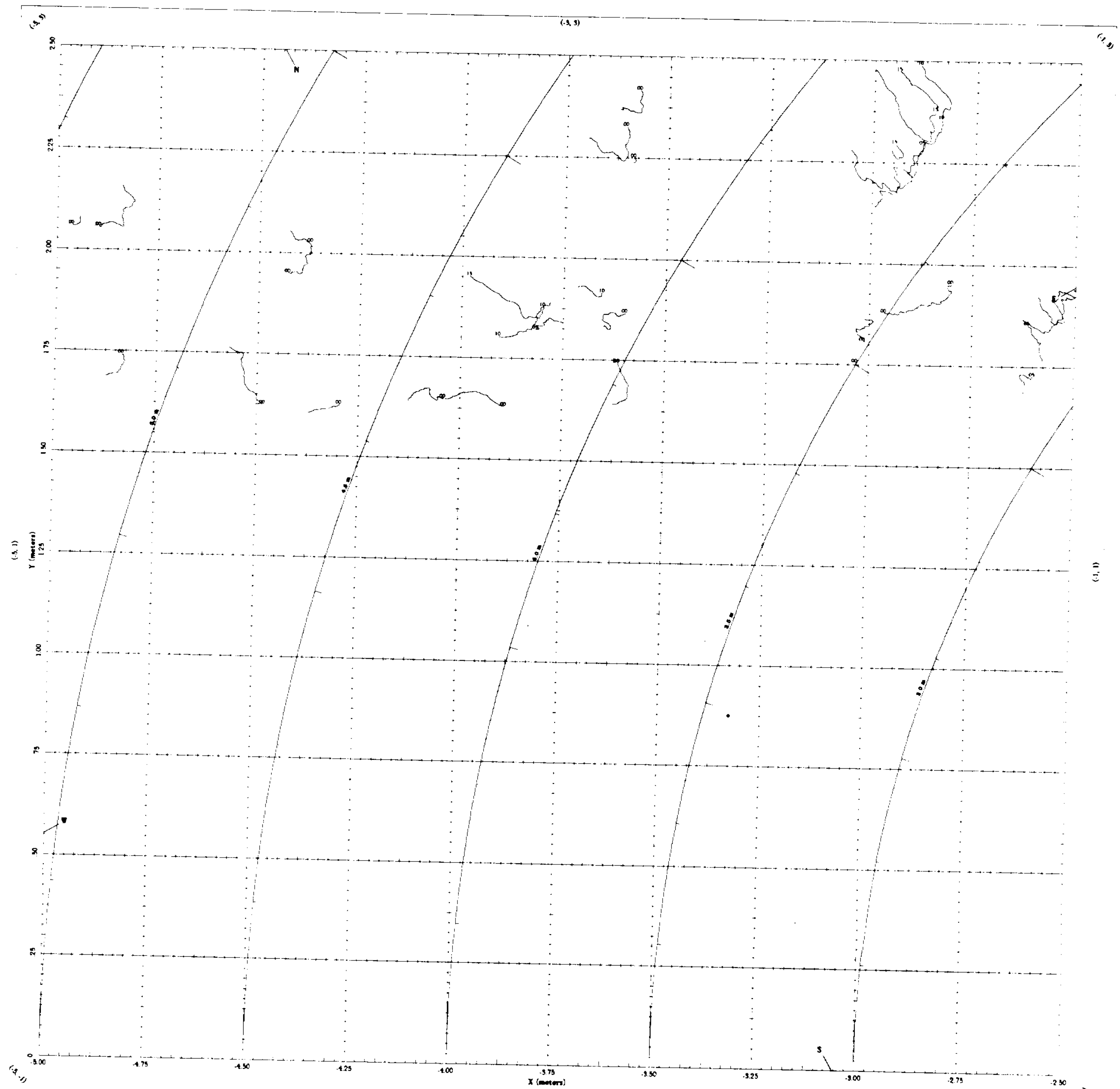
(1, 1)

Range Data Set Files	
JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract [illegible] and JPL 955249, and grant NSG 7138

[illegible] OCTOBER 1979


(3, 5)
(1, 5)
(5, 5)
(1, 3)
(5, 3)
(1, 1)
(5, 1)
(3, 1)
Y (meters)
X (meters)
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
N
E
S
VIKING LANDER 2
SCALE 1 : 5 SHEET (3, 3)
(Elevations (interval variable) in meters.)
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.
Range Data Set Files
JPL Stanford:
L2.RDSC FRONT L2CFP
L2.RDSC FRONT2 L2CFP2
L2.RDSC EDR FRONT L2CFA
L2.RDSC BACK L2CBP
L2.RDSC EDR BACK L2CBA
OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis

VIKING LANDER 2

SCALE 1 : 5 SHEET (-3, 1)

(Elevations (interval variable) in meters.)

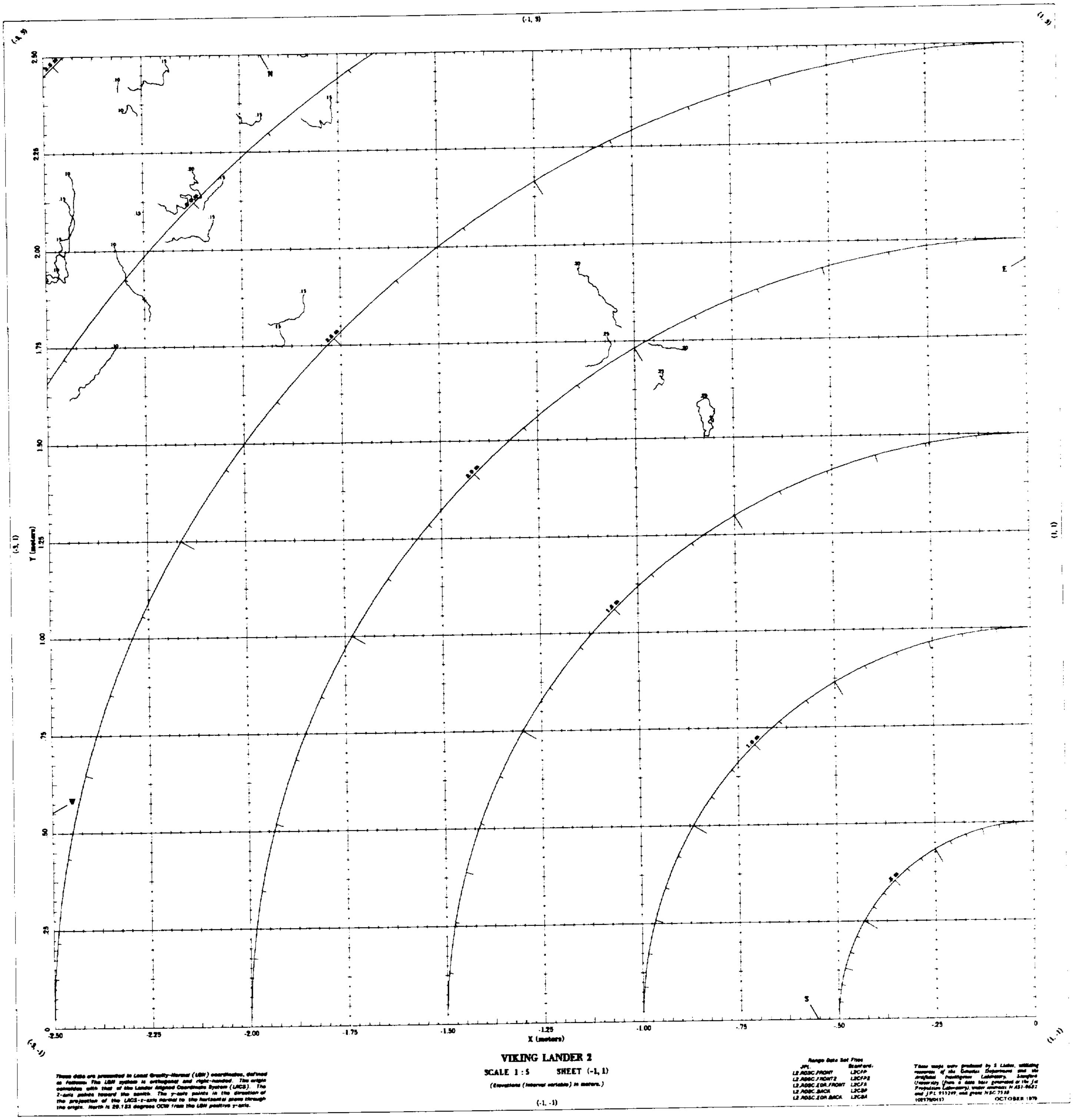
(-3, -1)

Range Data Set Files

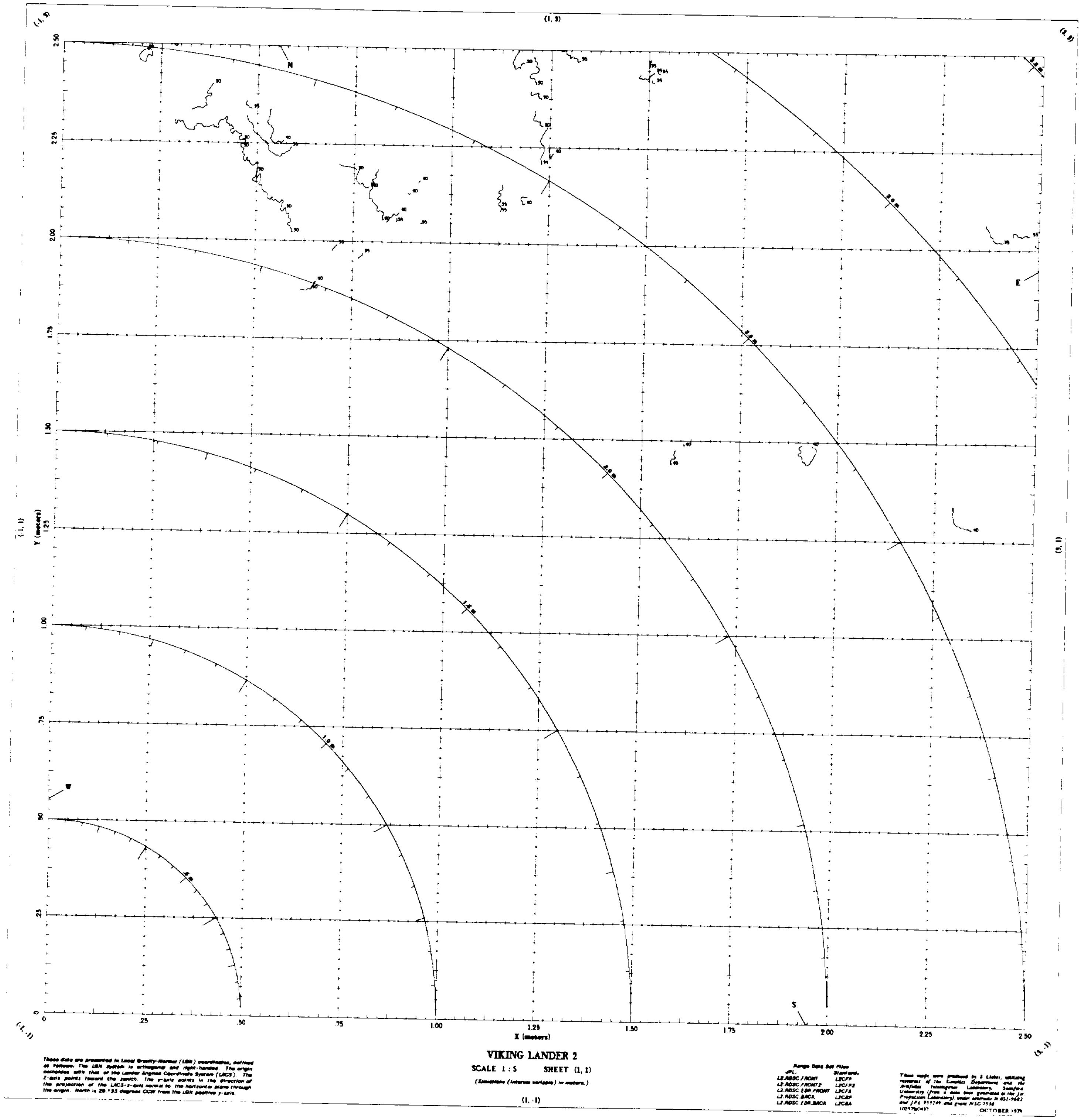
JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

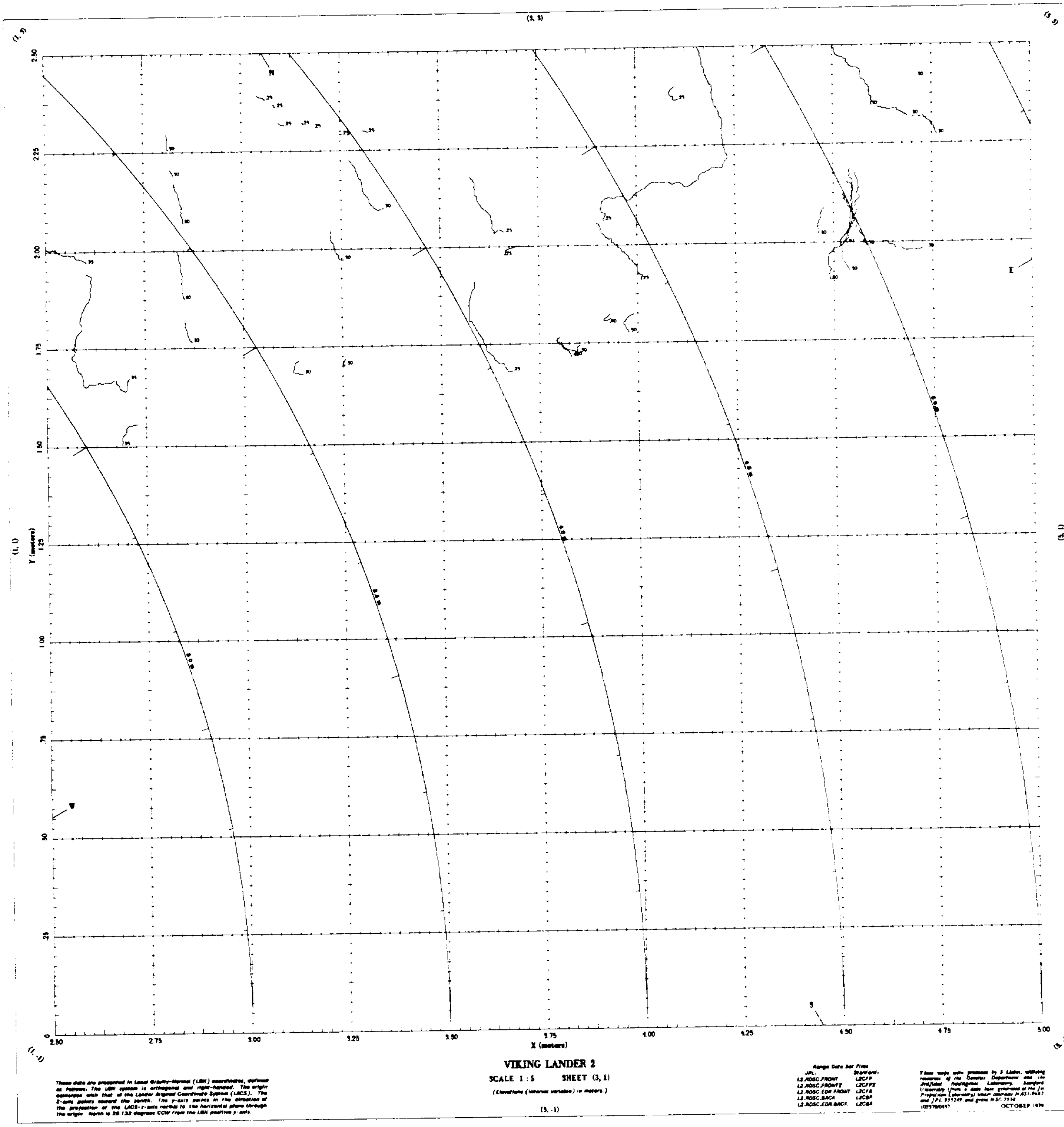
These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249 and grant NSG-7338

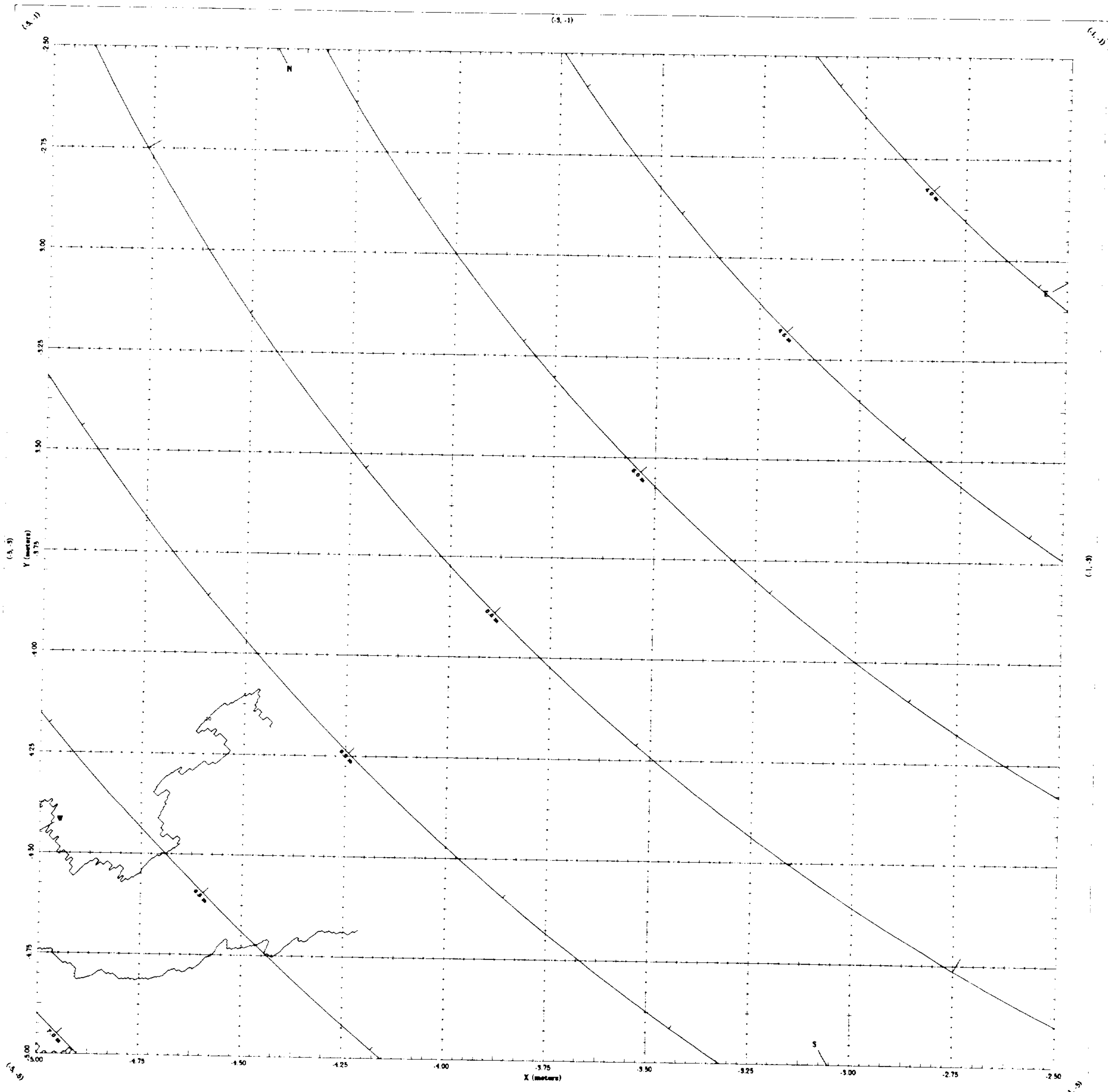
OCTOBER 1979



(-1, 3)
X (meters)
Y (meters)
VIKING LANDER 2
SCALE 1 : 5 SHEET (-1, 1)
(Elevations (interval variable) in meters.)
(-1, -1)
Range Data Set Files
L2.RDSC.FRONT L2CFP
L2.RDSC.FRONT2 L2CFP2
L2.RDSC.EDR.FRONT L2CFA
L2.RDSC.BACK L2CBP
L2.RDSC.EDR.BACK L2CBA
OCTOBER 1979


(1, 3)
(-1, 3)
(3, 3)
(-1, 1)
(3, 1)
(-1, -1)
(3, -1)
N
E
W
S
Y (meters)
X (meters)
0
.25
.50
.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.
VIKING LANDER 2
SCALE 1 : 5
SHEET (1, 1)
(Elevations (interval variable) in meters.)
(1, -1)
Range Data Set Files
JPL:
Stanford:
L2.RDSC.FRONT
L2CFP
L2.RDSC.FRONT2
L2CFP2
L2.RDSC.EDR.FRONT
L2CFA
L2.RDSC.BACK
L2CBP
L2.RDSC.EDR.BACK
L2CBA


VIKING LANDER 2
SCALE 1 : 5
SHEET (3, 1)
(Elevations (interval variable) in meters.)
X (meters)
Y (meters)
(3, -1)
Range Data Set Files
JPL: Stanford:
L2.RDSC.FRONT L2CFP
L2.RDSC.FRONT2 L2CFP2
L2.RDSC.EDR.FRONT L2CFA
L2.RDSC.BACK L2CBP
L2.RDSC.EDR.BACK L2CBA
OCTOBER 1979
N
E
S
W



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 5 SHEET (-3, -3)

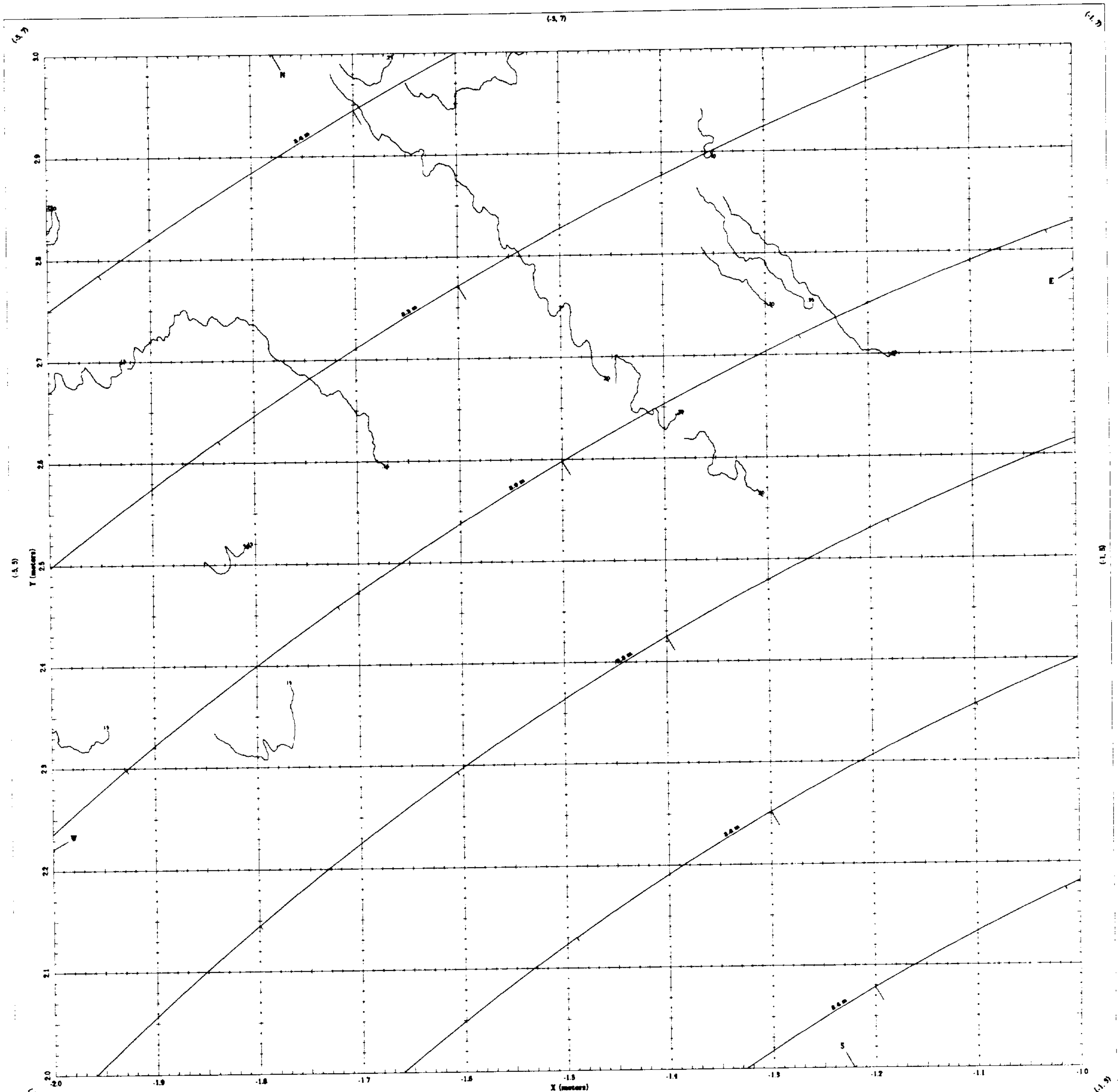
(Elevations (interval variable) in meters.)

(-3, -5)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSC 7318
[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (-3, 5)

(Elevations (internal variable) in meters.)

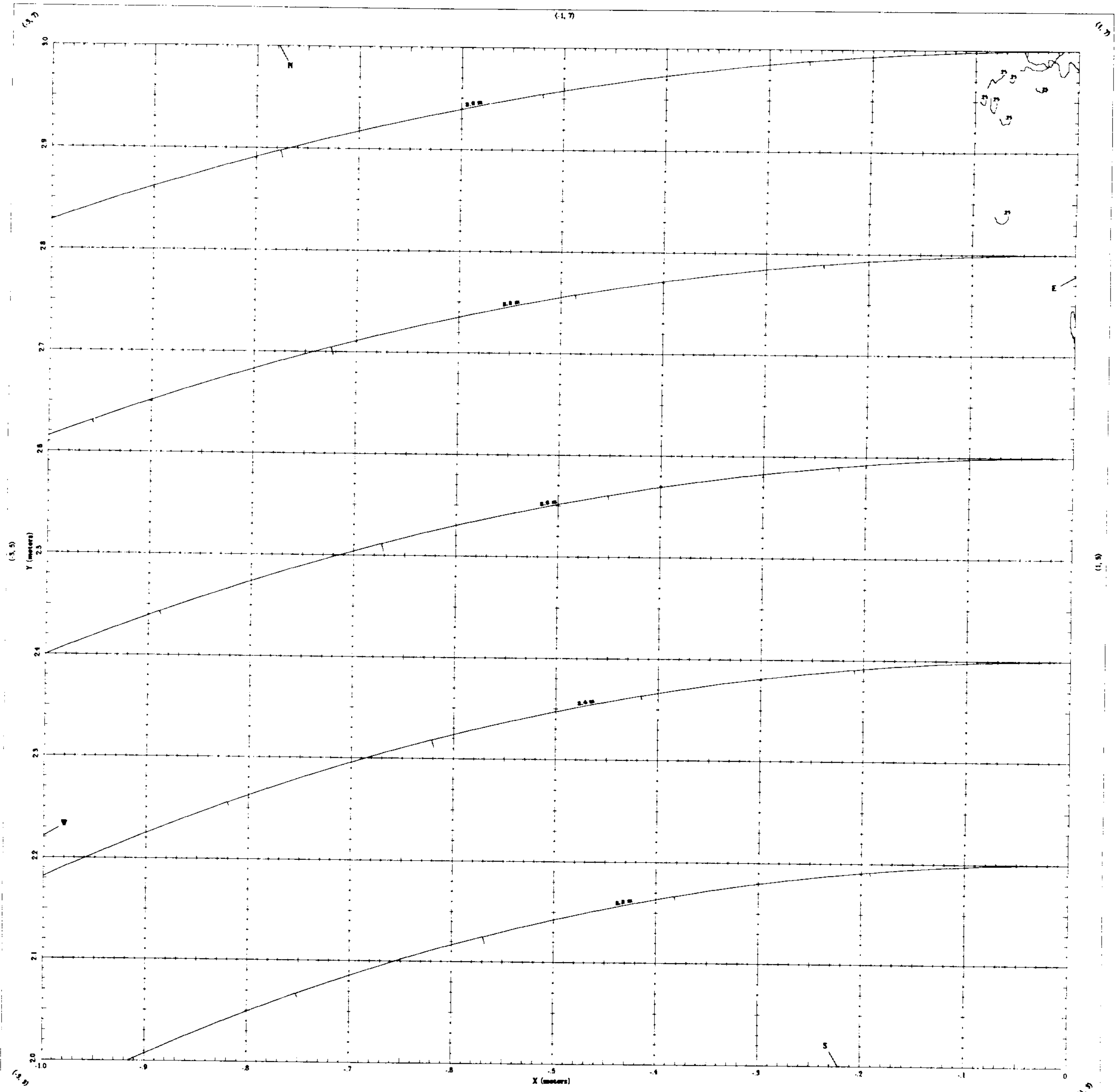
(-3, 5)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing facilities of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 955249, and grant NSG 7538

[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (-1, 5)

(Elevations (interval variable) in meters.)

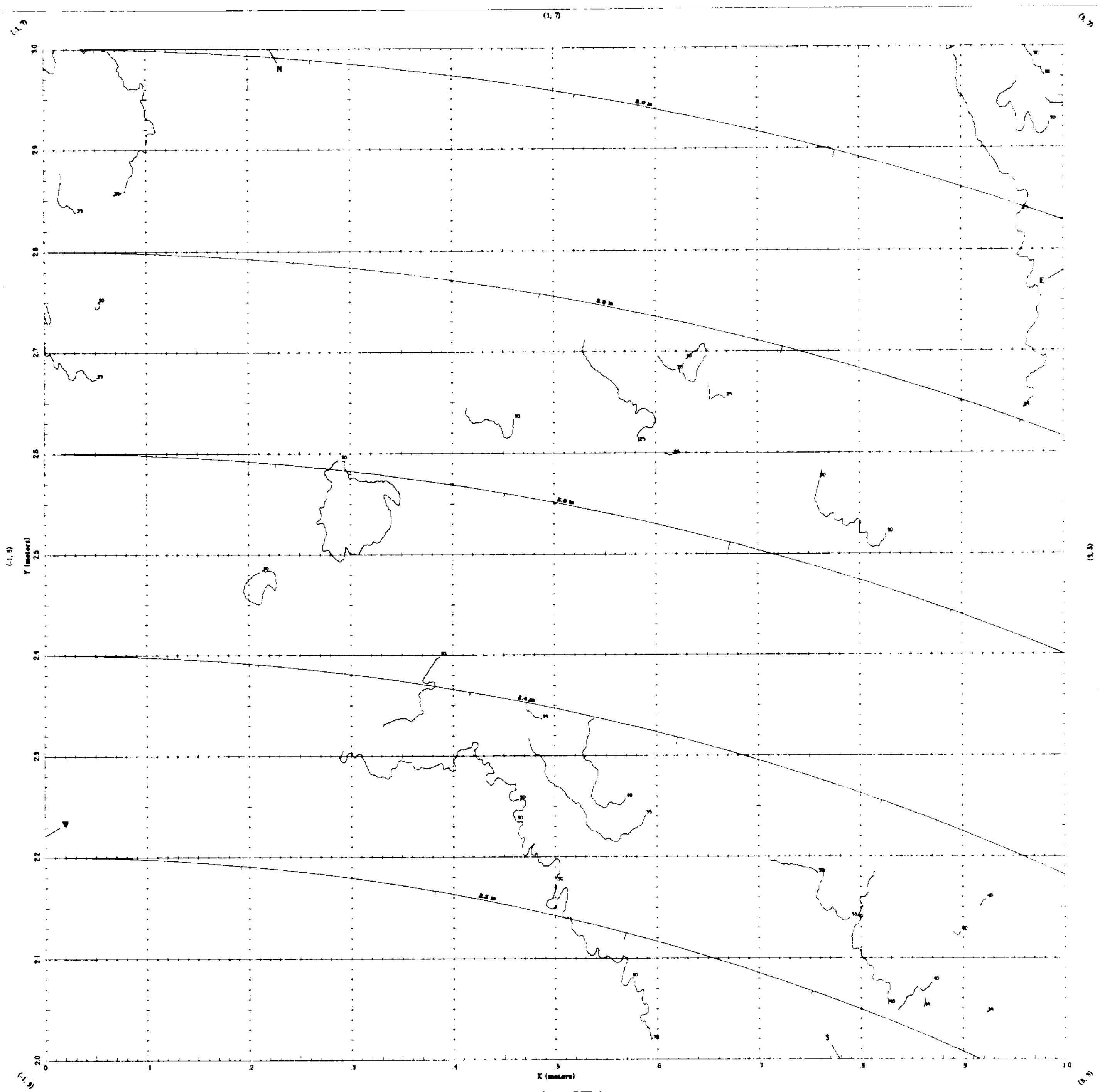
(-1, 5)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7338.

10297W0497 OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (1, 5)

(Elevations (interval variable) in meters.)

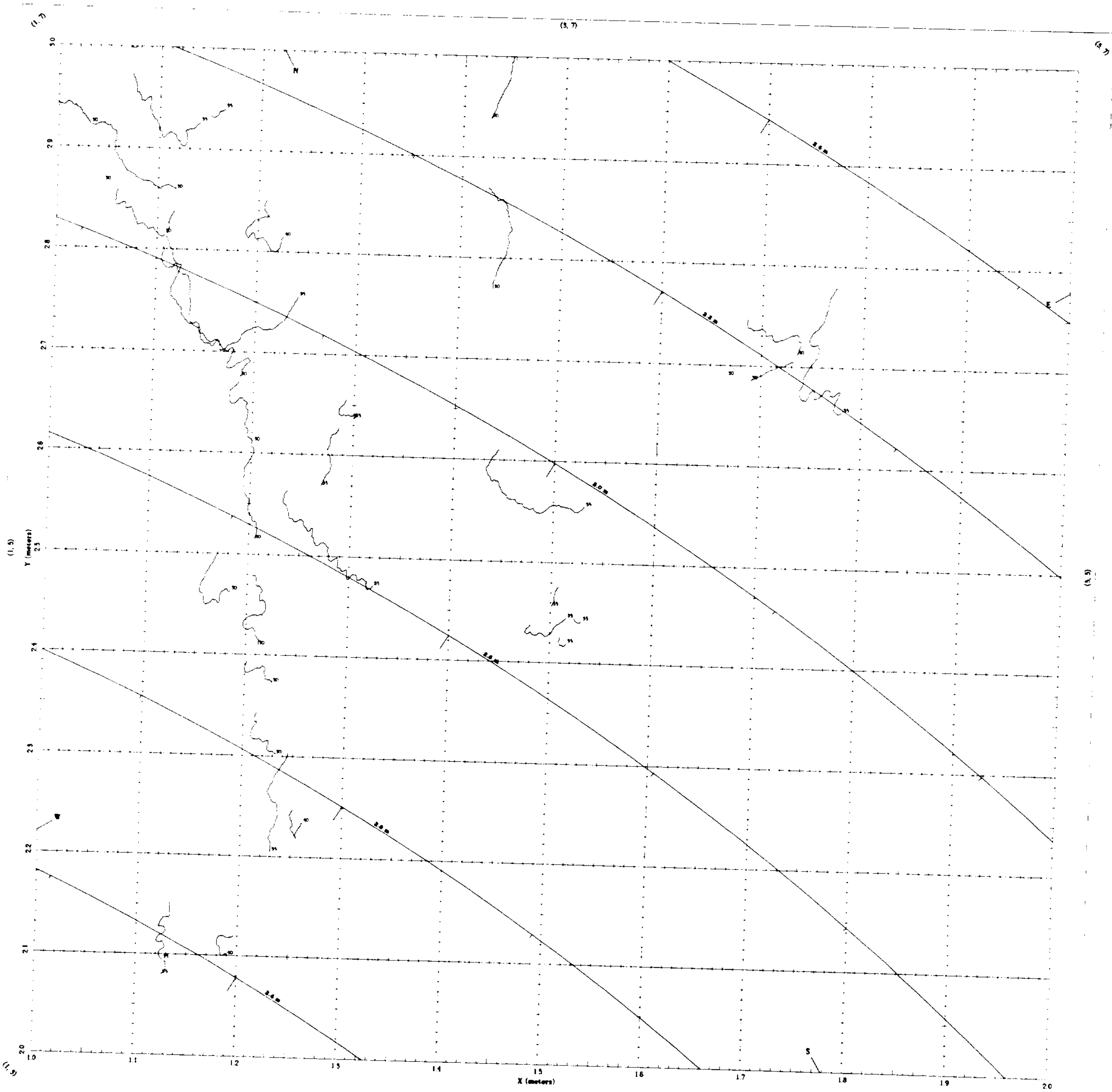
(1, 5)

Range Data Set Files

JPL:	Stanford:
L2.ADSC.FRONT	L2CFP
L2.ADSC.FRONT2	L2CFP2
L2.ADSC.EDR.FRONT	L2CFA
L2.ADSC.BACK	L2CBP
L2.ADSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7328.

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 2 SHEET (3, 5)

(Elevations (interval variable) in meters.)

(3, 3)

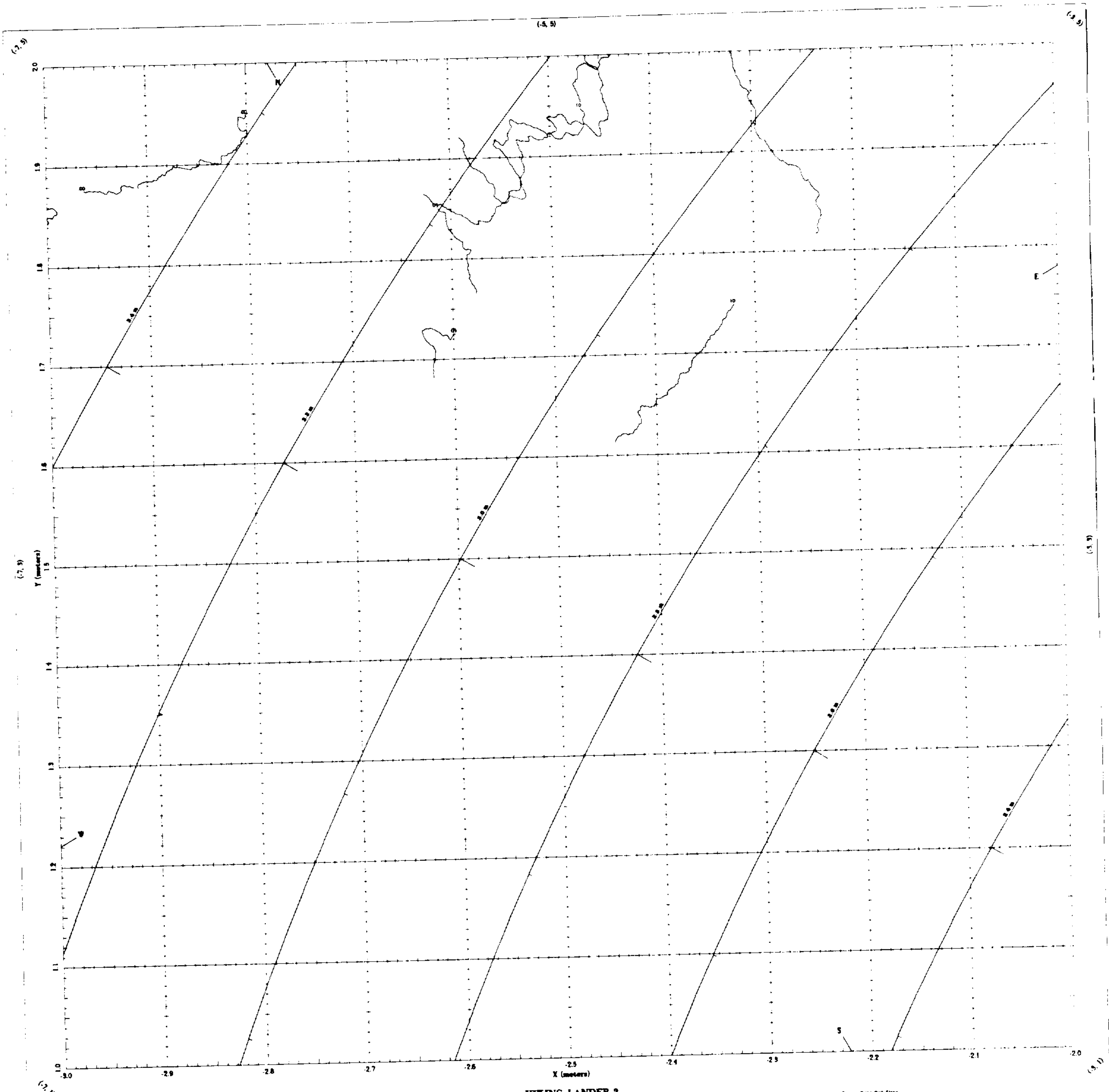
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7318.

[illegible] OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 2 SHEET (-5, 3)

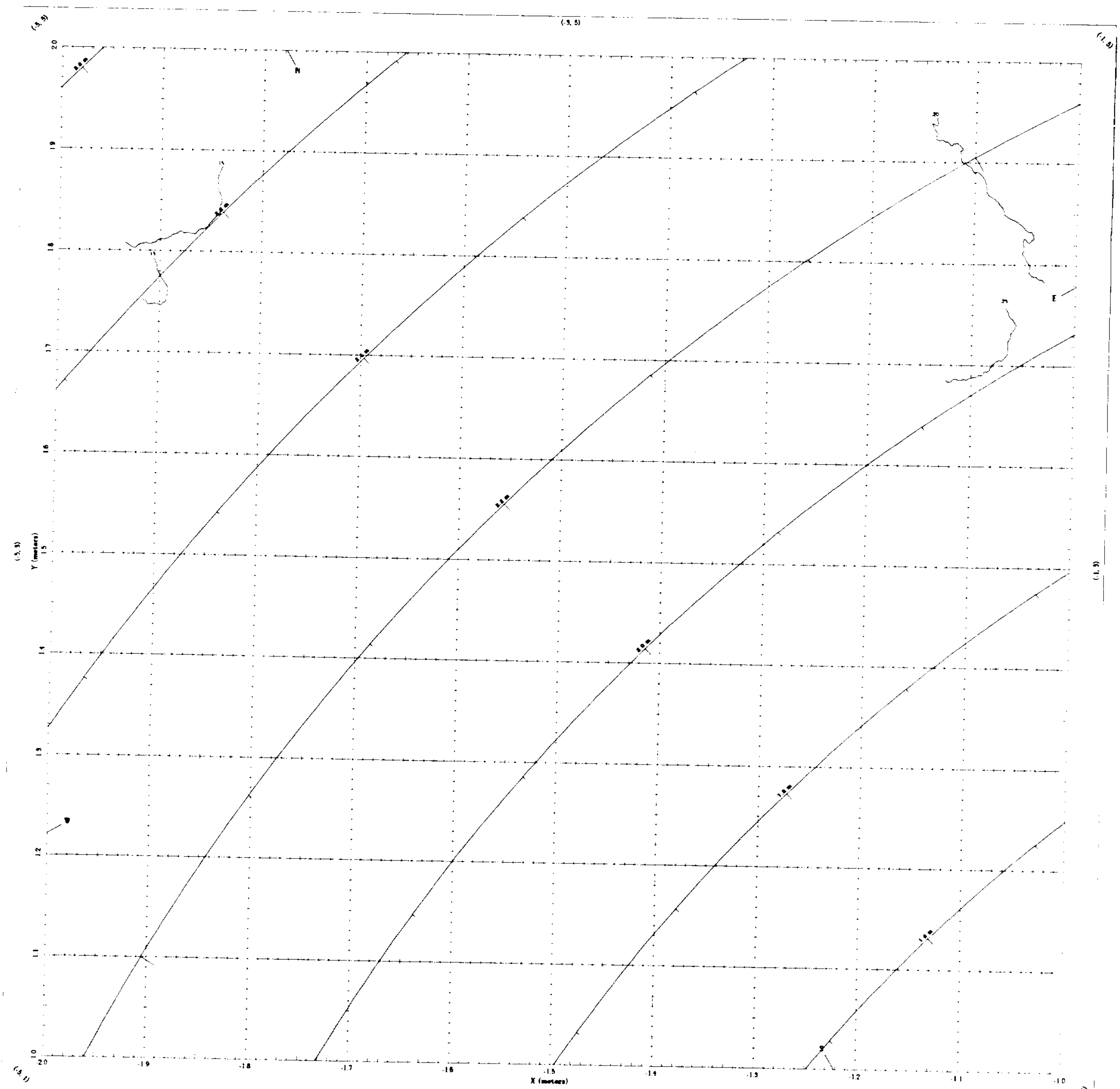
(Elevations (interval variable) in meters.)

(-5, 1)

These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (-3, 3)

(Elevations (interval variable) in meters.)

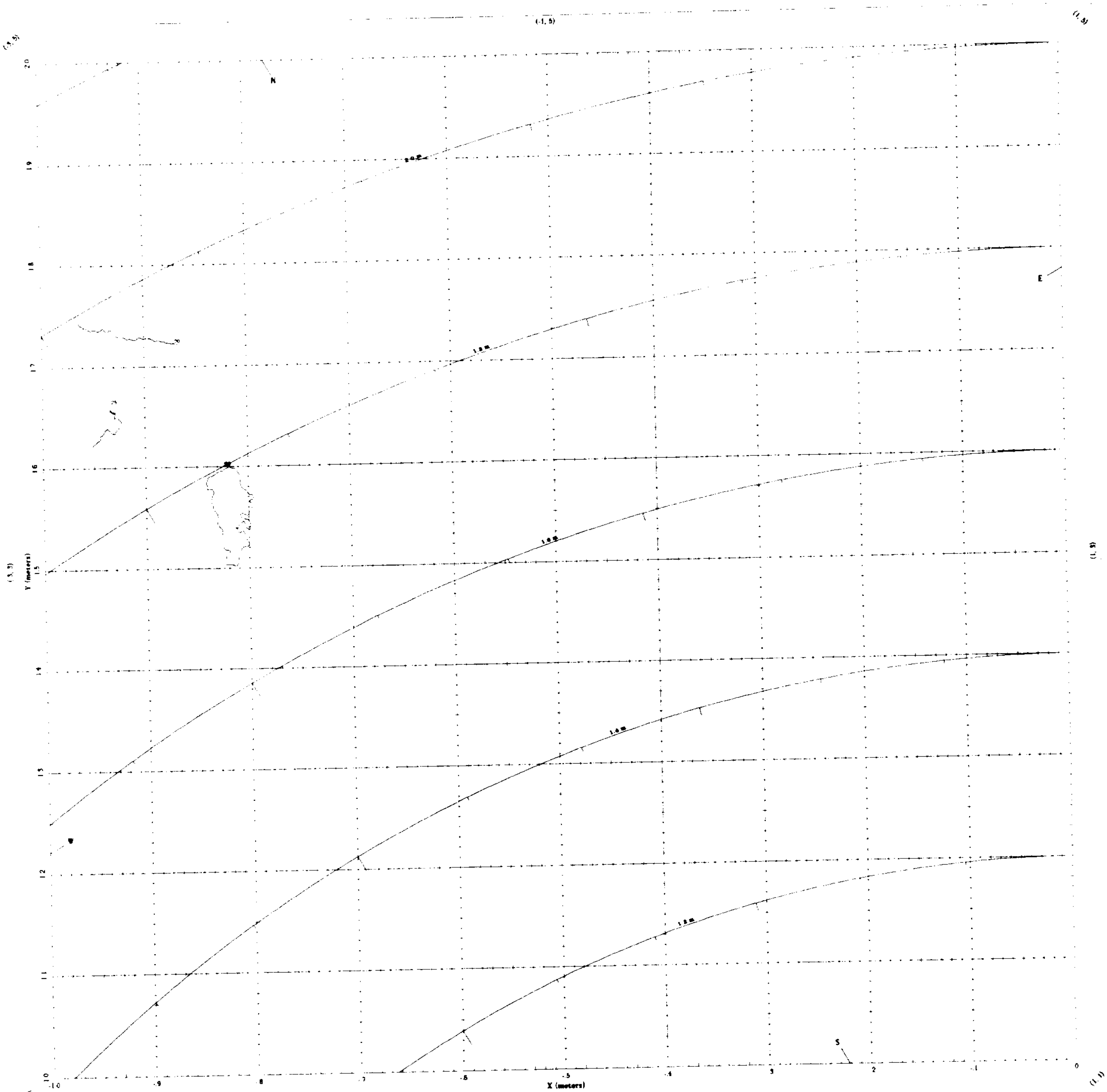
(-3, 1)

Range Data Set Files

JPL	Stanford
L2 RDSC FRONT	L2CFP
L2 RDSC FRONT2	L2CFP2
L2 RDSC EDR FRONT	L2CFA
L2 RDSC BACK	L2CBP
L2 RDSC EDR BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9682 and JPL 953349 and grant NSG 7538. [illegible]

OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 2 SHEET (-1, 3)

(Elevations (interval variable) in meters.)

(-1, 1)

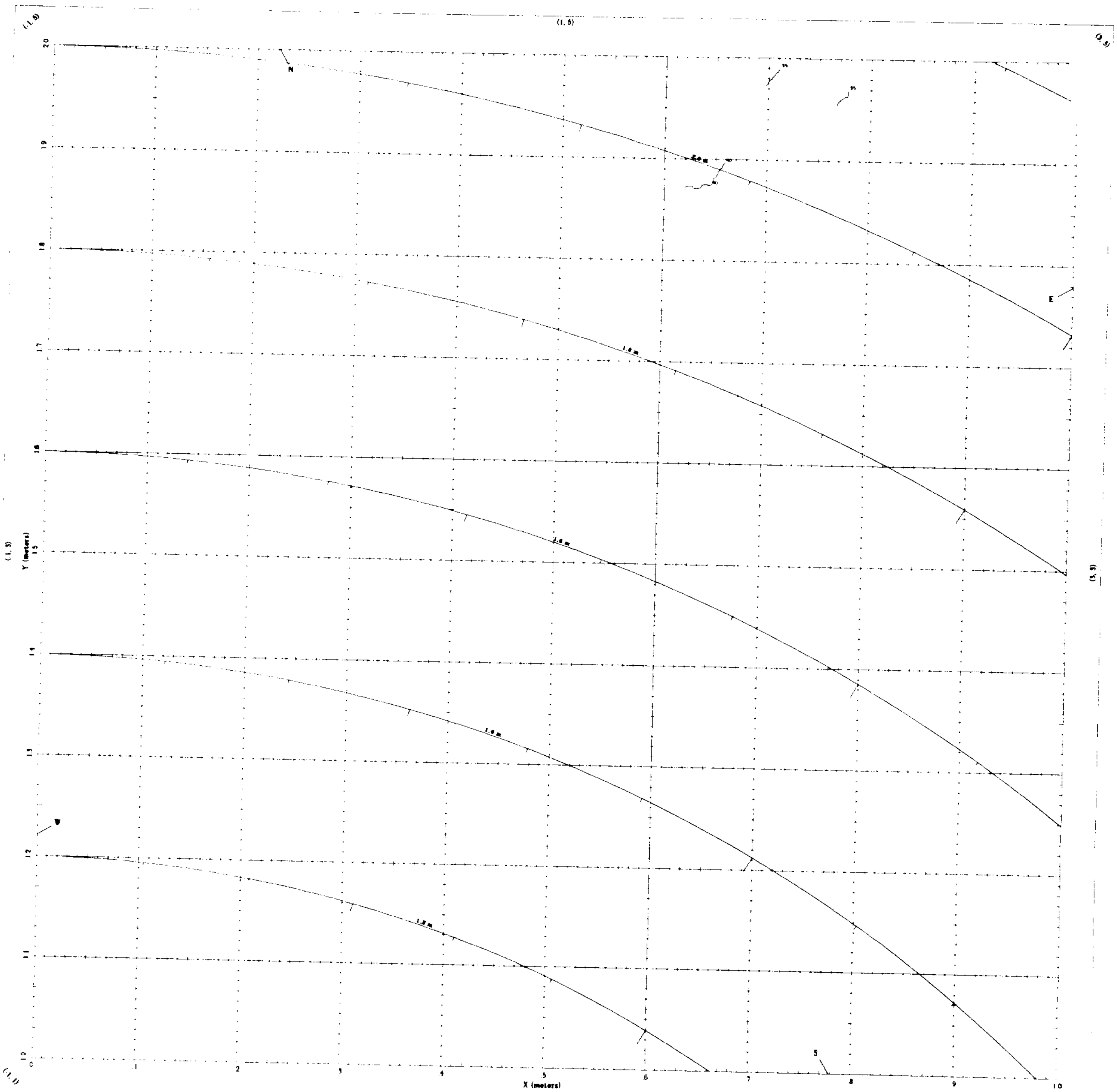
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7138.

D11080(1831) OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (1, 3)

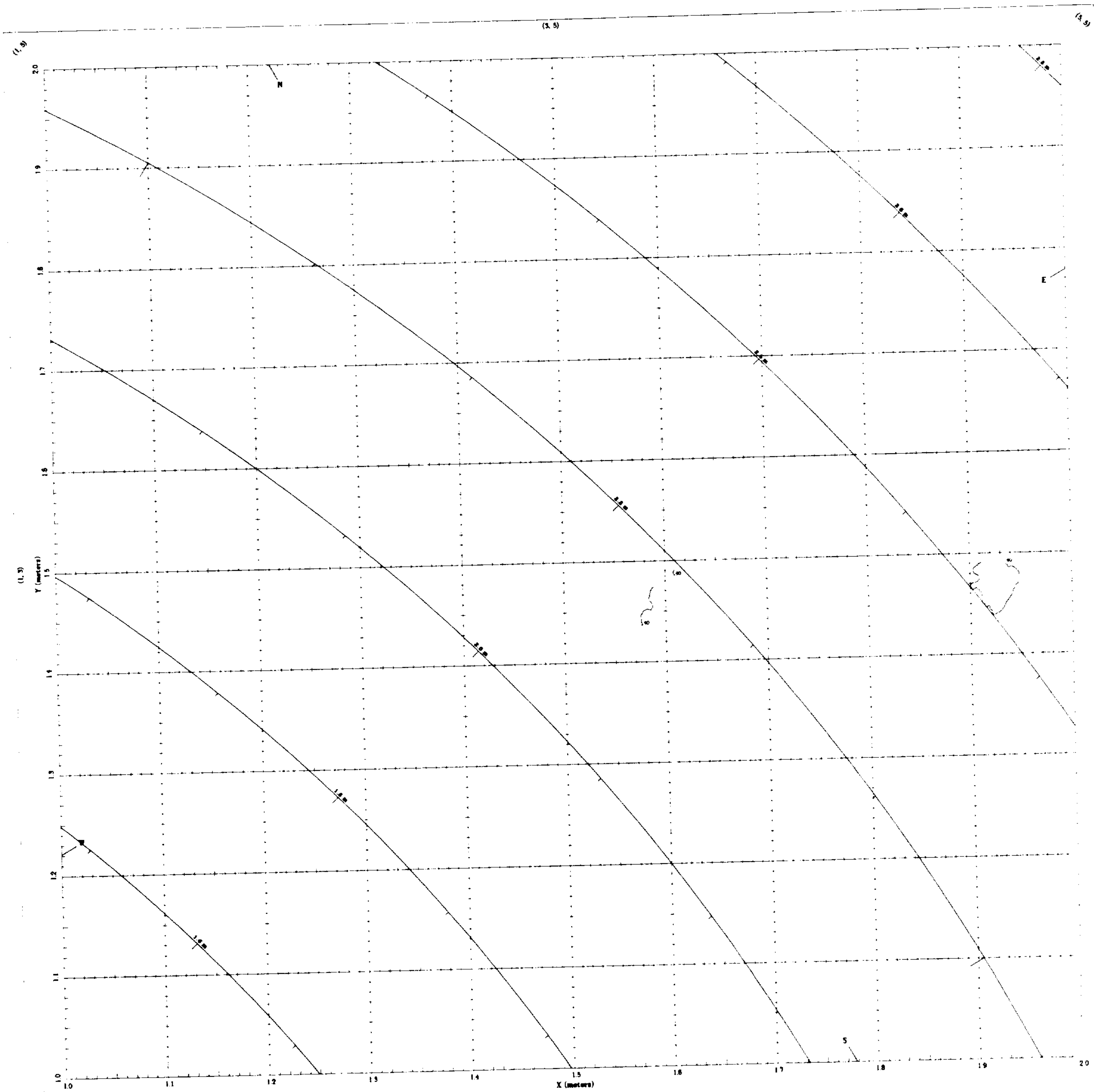
(Elevations (interval variable) in meters.)

(1, 1)

Range Data Set Files JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953249 and grant NSG 7138.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-y-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 2 SHEET (3, 3)

(Elevations (interval variable) in meters.)

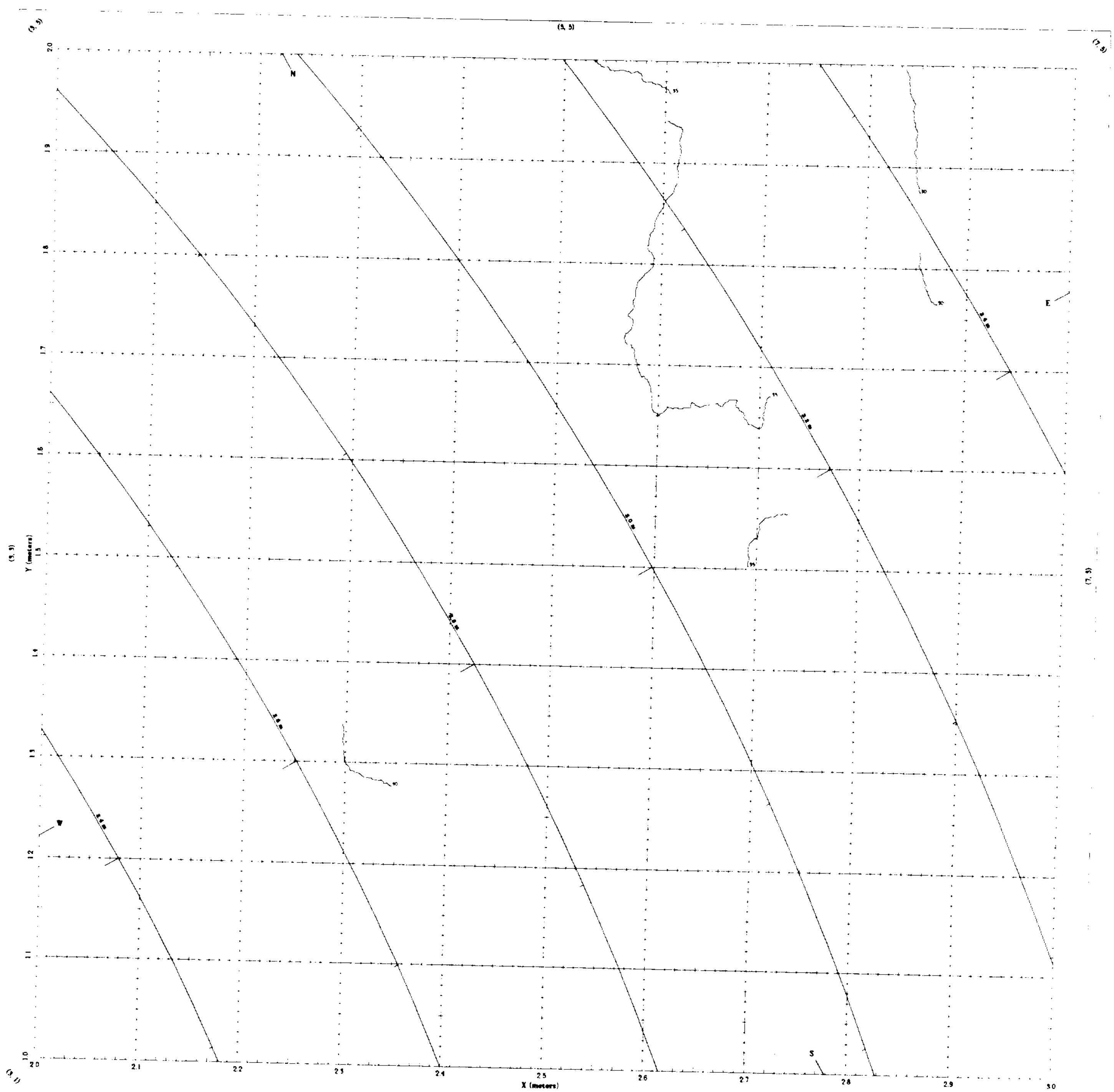
(3, 1)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT3	L2CFP3
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9687 and JPL 953269, and grant NSG 7196.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis

VIKING LANDER 2

SCALE 1 : 2 SHEET (5, 3)

(Elevations (interval variable) in meters.)

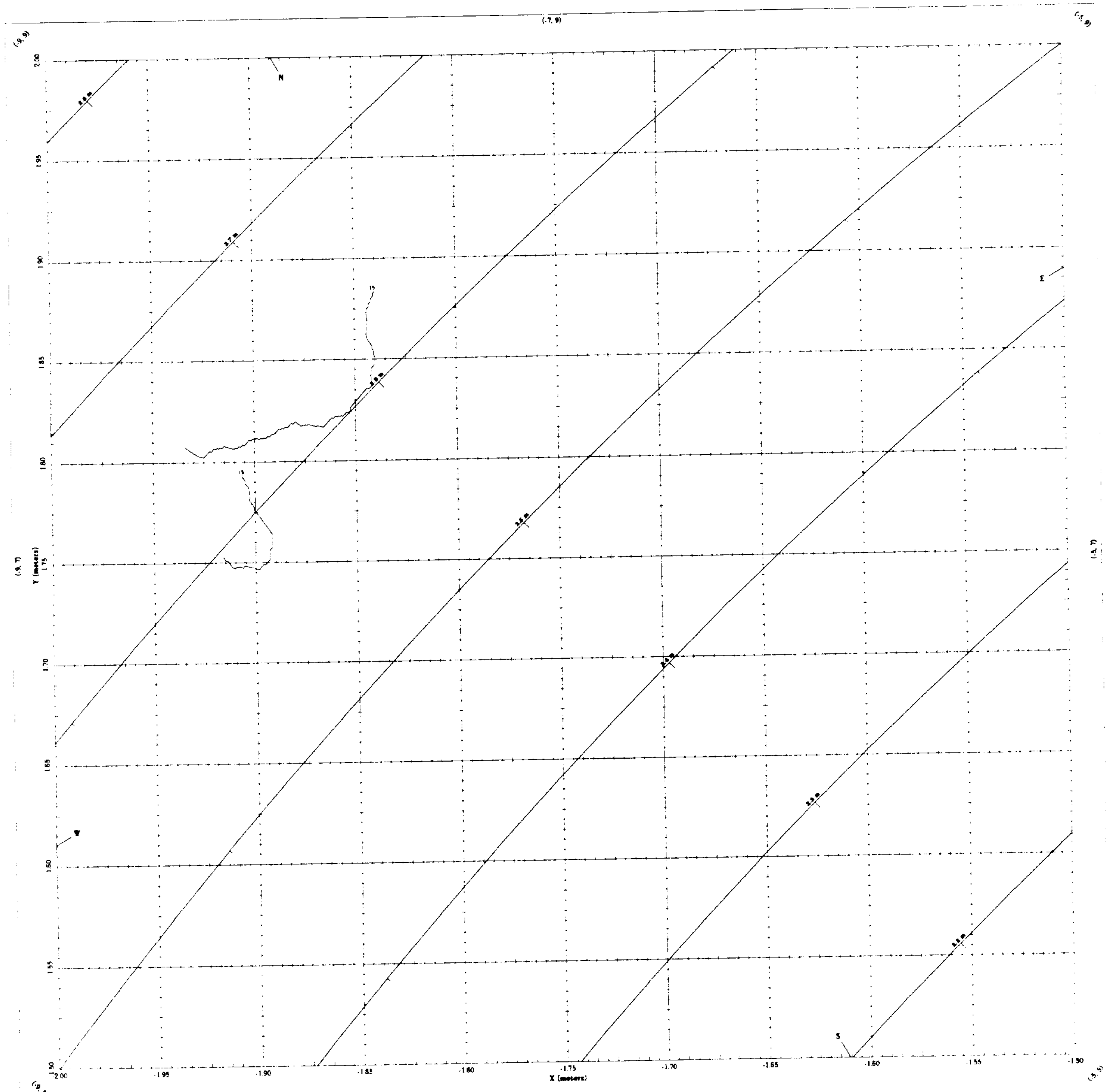
(5, 1)

Range Data Set Files

JPL	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts N.A.S.1-9682 and JPL 955249 and grant NSG 7138

1029790493 OCTOBER 1979



VIKING LANDER 2

SCALE 1 : 1 SHEET (-7, 7)

(Elevations (interval variable) in meters.)

(-7, 5)

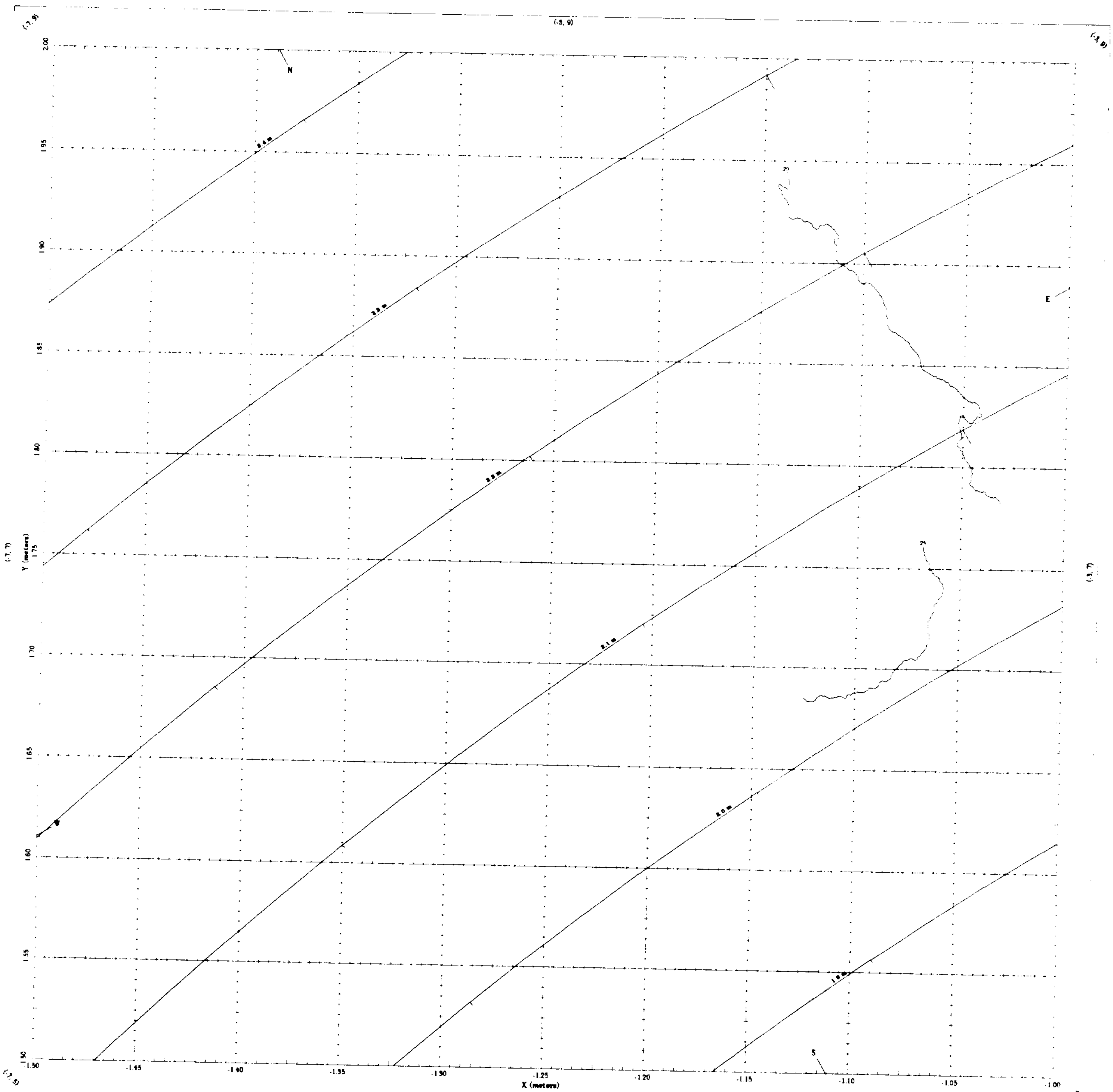
These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL 955249, and grant [illegible].

10297[illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 26.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 1 SHEET (-5, 7)

(Elevations (interval variable) in meters.)

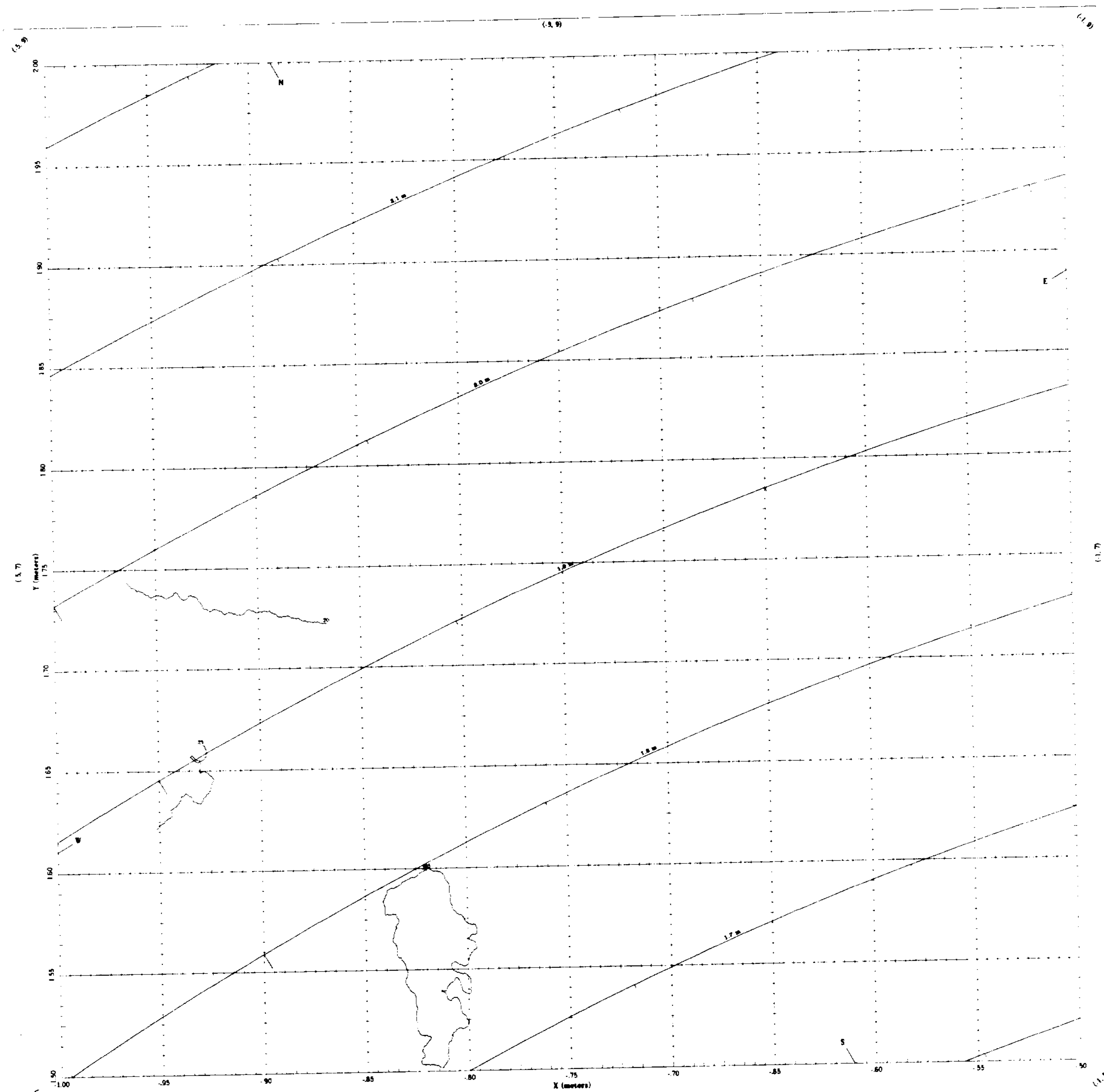
(-5, 5)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7138

[illegible] OCTOBER [illegible]



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 29.132 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 1 SHEET (-3, 7)

(Elevations (interval variable) in meters.)

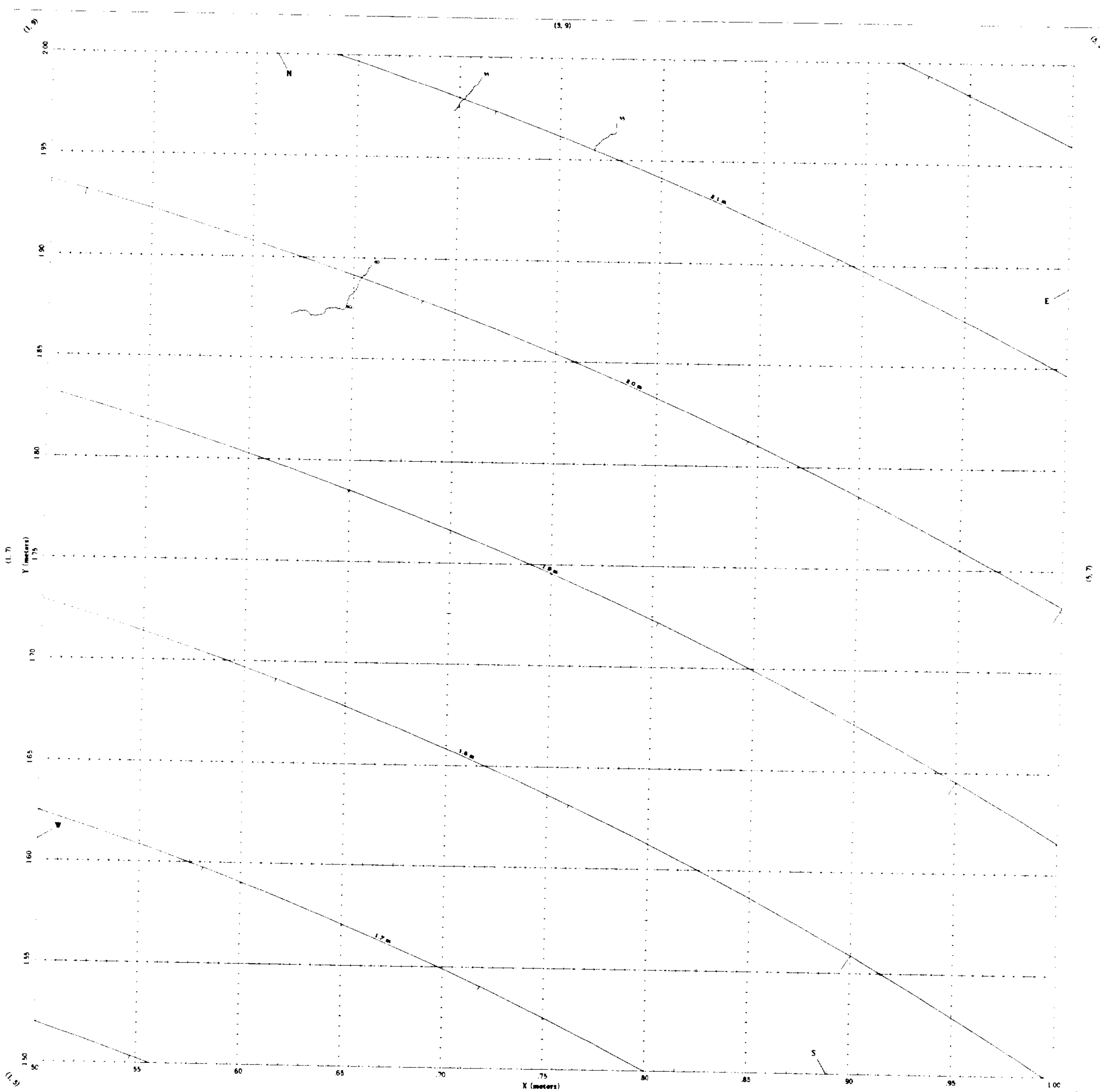
(-3, 5)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EOR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EOR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7312.

OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows: The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-z-axis normal to the horizontal plane through the origin. North is 29.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 1 SHEET (3, 7)

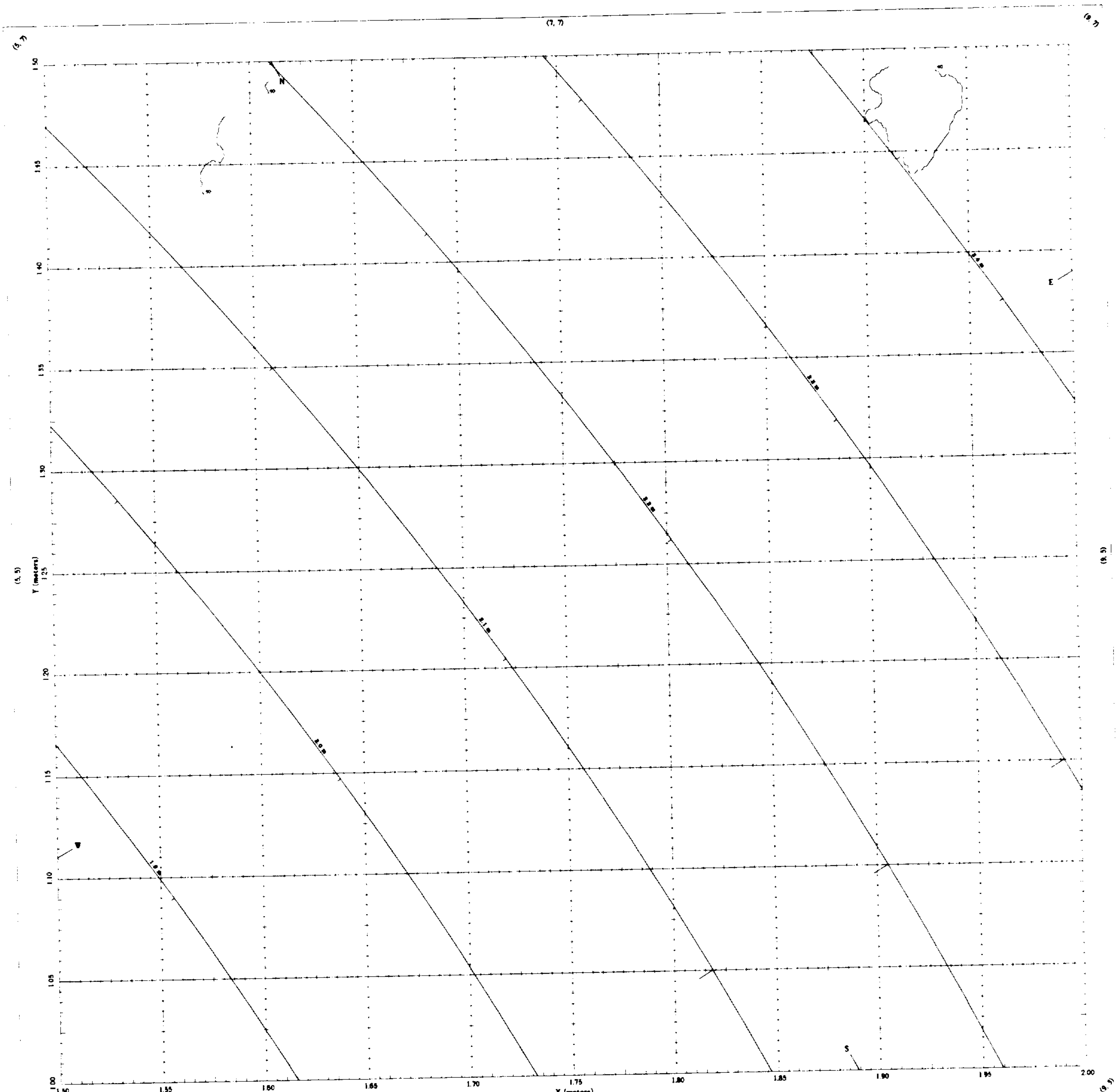
(Elevations (interval variable) in meters)

(3, 5)

Range Data Set Files

JPL	Stanford
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by [illegible], utilizing resources of the Computer [illegible] Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 955249 and grant NSG 2538 [illegible] OCTOBER 1979



These data are presented in Local Gravity-Normal (LGN) coordinates, defined as follows. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS-x-axis normal to the horizontal plane through the origin. North is 26.133 degrees CCW from the LGN positive y-axis.

VIKING LANDER 2

SCALE 1 : 1 SHEET (7, 5)

(Elevations (interval variable) in meters.)

(7, 3)

Range Data Set Files

JPL:	Stanford:
L2.RDSC.FRONT	L2CFP
L2.RDSC.FRONT2	L2CFP2
L2.RDSC.EDR.FRONT	L2CFA
L2.RDSC.BACK	L2CBP
L2.RDSC.EDR.BACK	L2CBA

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9682 and JPL 955249, and grant NSG 7338

1029790497 OCTOBER 1979

7. VERTICAL PROFILES

7.1 Vertical Profile Mosaic Overlay Stereo Pairs

This section contains mosaic stereo pairs of images into which have been overlayed the systematic vertical profiles. The general remarks of section 4.1 apply.

Fig. 51. Vertical Profile Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/10/11/060732.

Fig. 52. Vertical Profile Overlay Mosaic: Camera 2 (right), front left quadrant — from IPL PIC ID 79/03/15/032905.

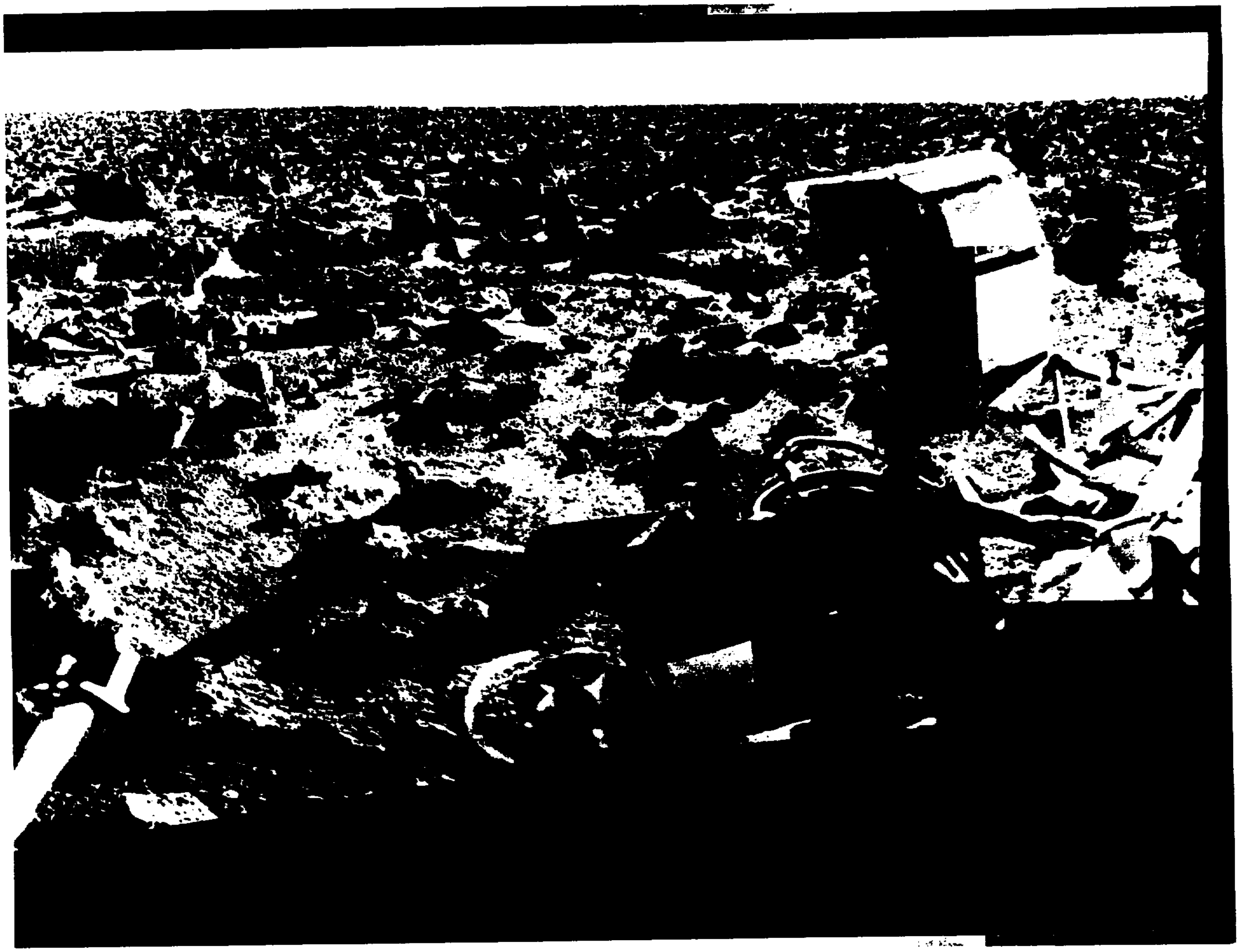


Fig. 53. Vertical Profile Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/10/11/060732.

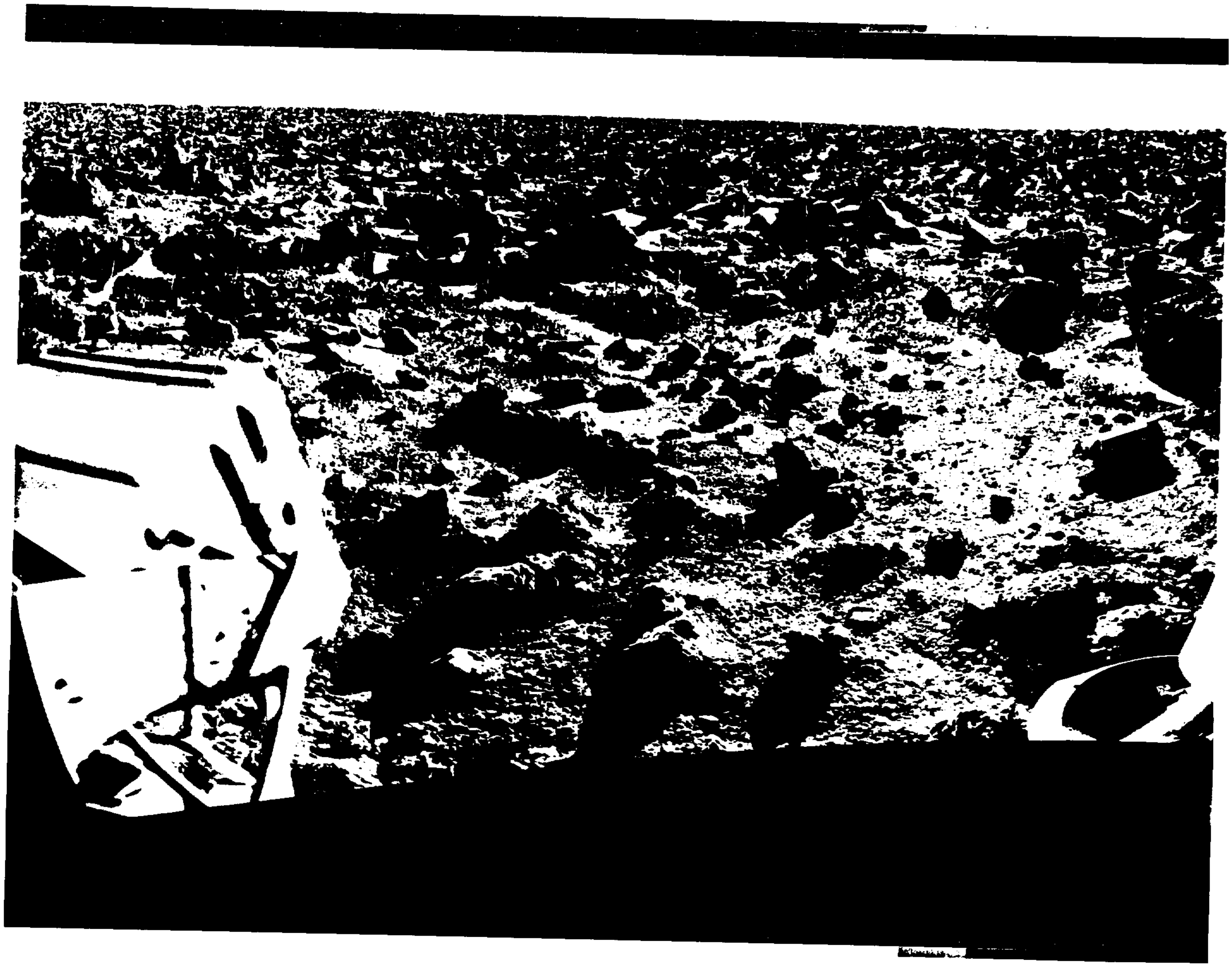


Fig. 54. Vertical Profile Overlay Mosaic: Camera 2 (right), front right quadrant — from IPL PIC ID 79/03/15/032905.

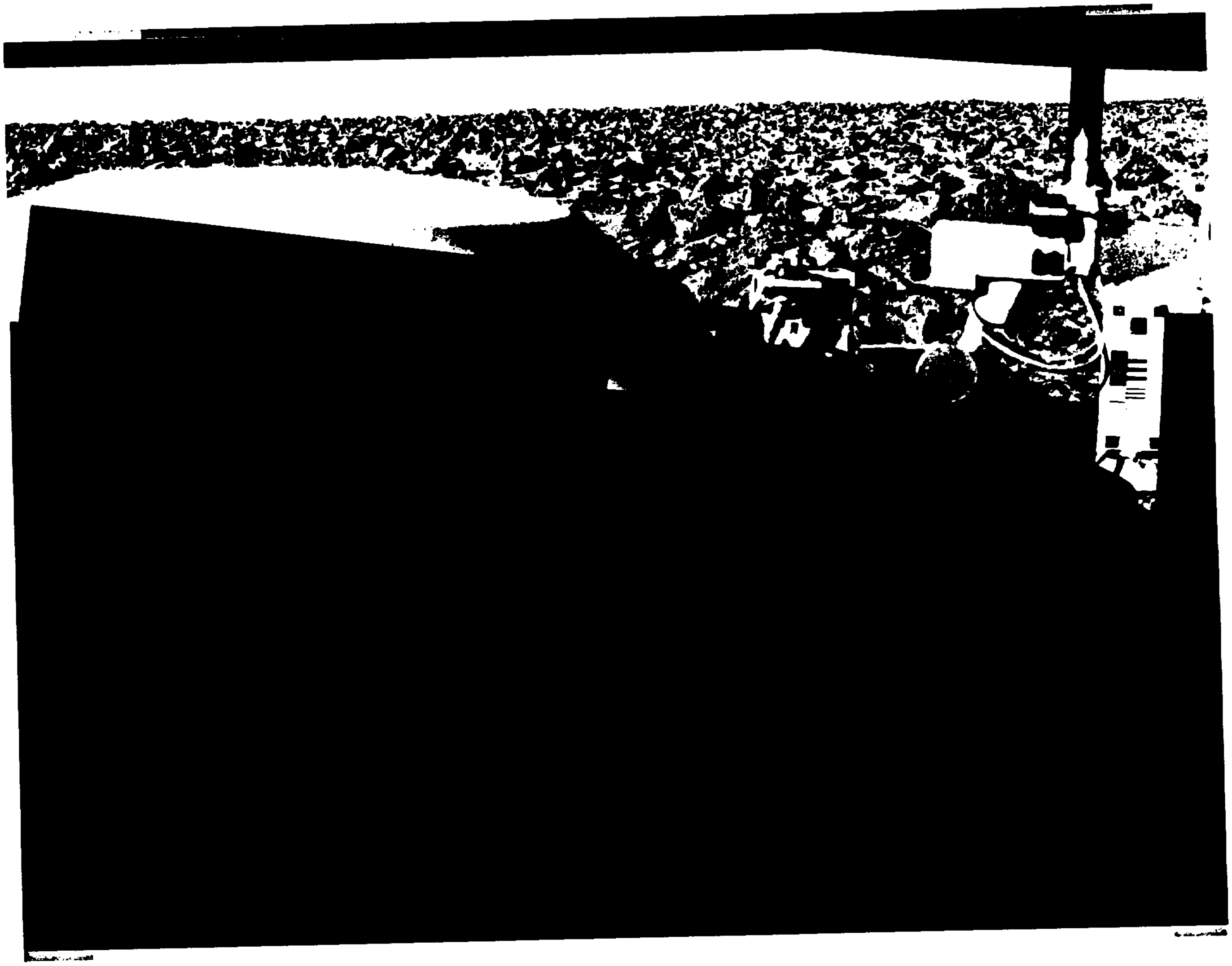


Fig. 55. Vertical Profile Overlay Mosaic: Camera 2 (left), back left quadrant — from IPL PIC ID 79/10/08/234537.

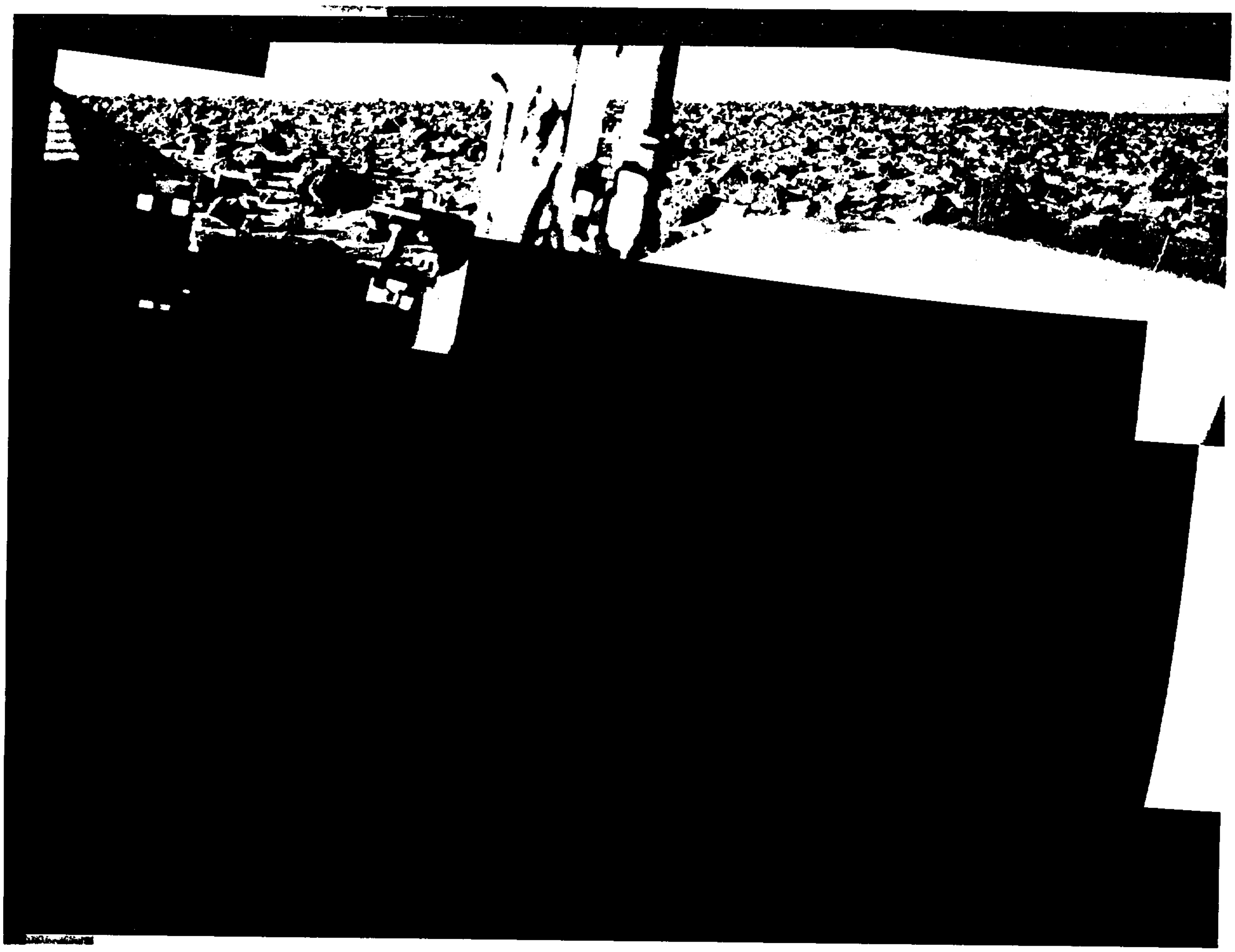


Fig. 56. Vertical Profile Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/04/04/041347.

Fig. 57. Vertical Profile Overlay Mosaic: Camera 2 (left), back right quadrant — from IPL PIC ID 79/10/08/234537.

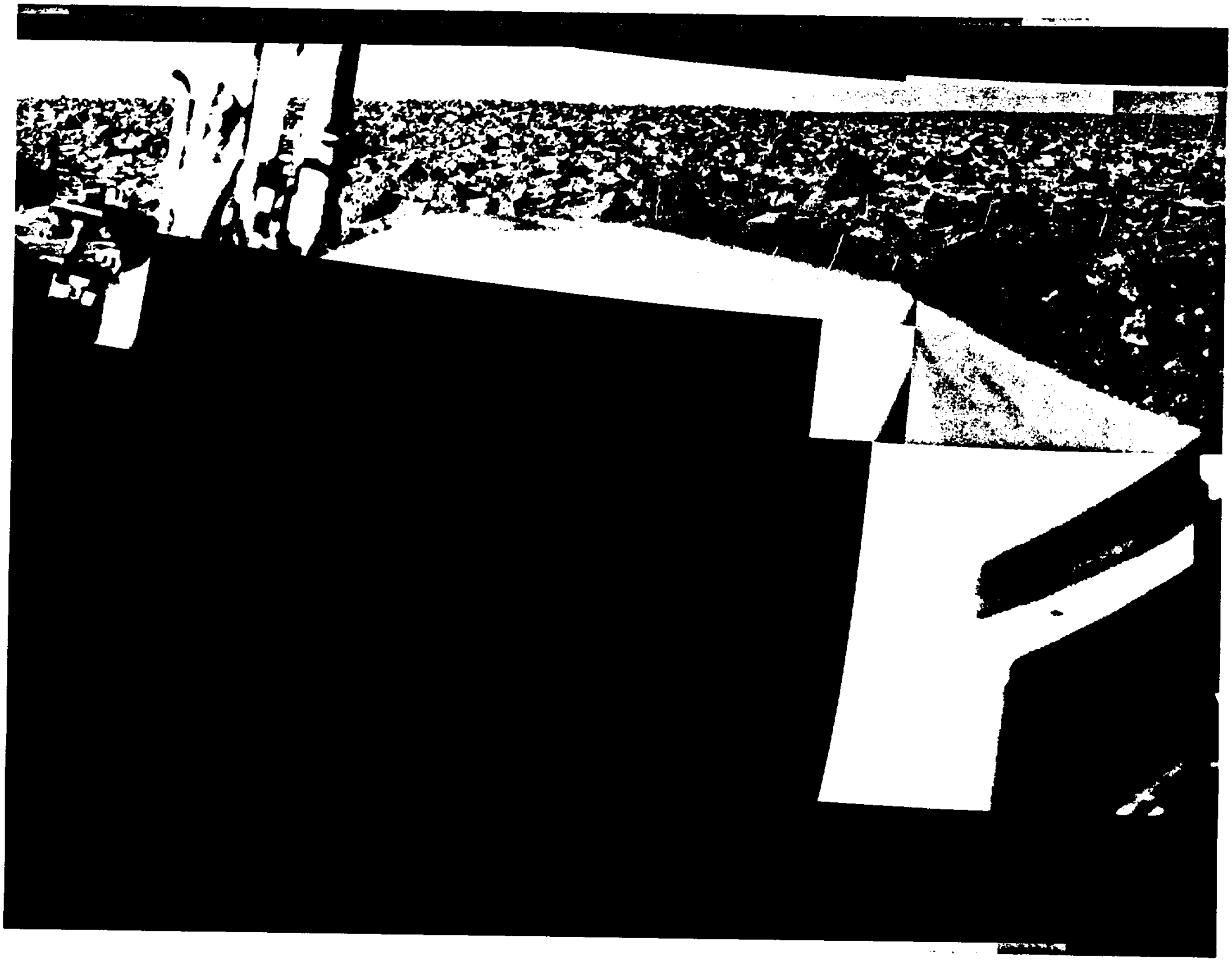


Fig. 58. Vertical Profile Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/04/04/041347.

7.2 Camera Perspective Annotated Vertical Profiles — Camera 1

This section contains camera-1 perspective representations of the elevation contour map data. The nature and purpose of these representations has been explained in section 3.2.1. On opposing pages are presented mosaic overlays of the elevation contour lines, and corresponding camera perspective representation of the map data, with the individual lines of the map data annotated with elevation values. The general discussion of section 4.1 applies to the mosaics of this section.

Fig. 59. Vertical Profile Overlay Mosaic: Camera 1 (left), front left quadrant — from IPL PIC ID 79/10/11/060732.

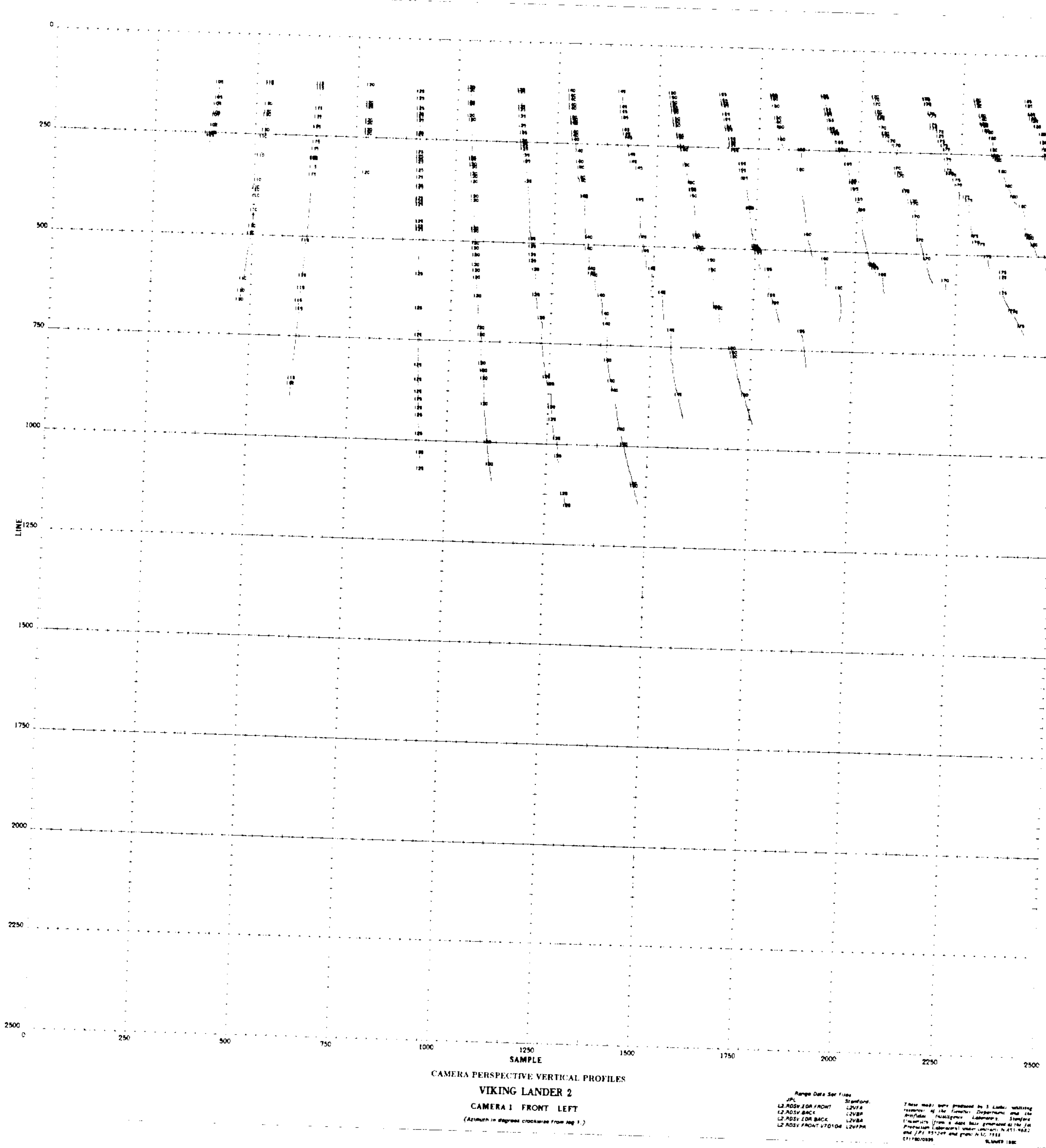


Fig. 60. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), front left quadrant.

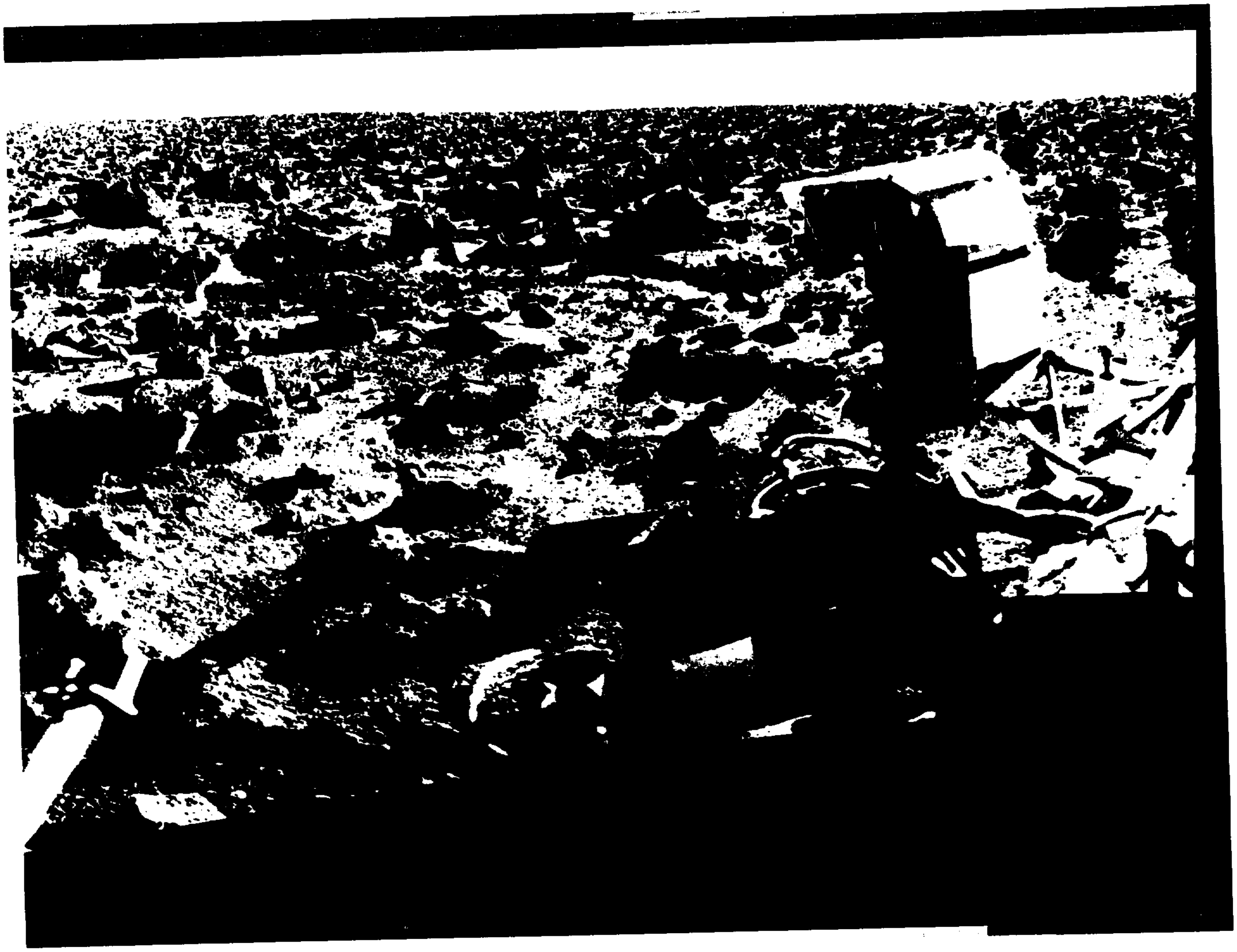


Fig. 61. Vertical Profile Overlay Mosaic: Camera 1 (left), front right quadrant — from IPL PIC ID 79/10/11/060732.

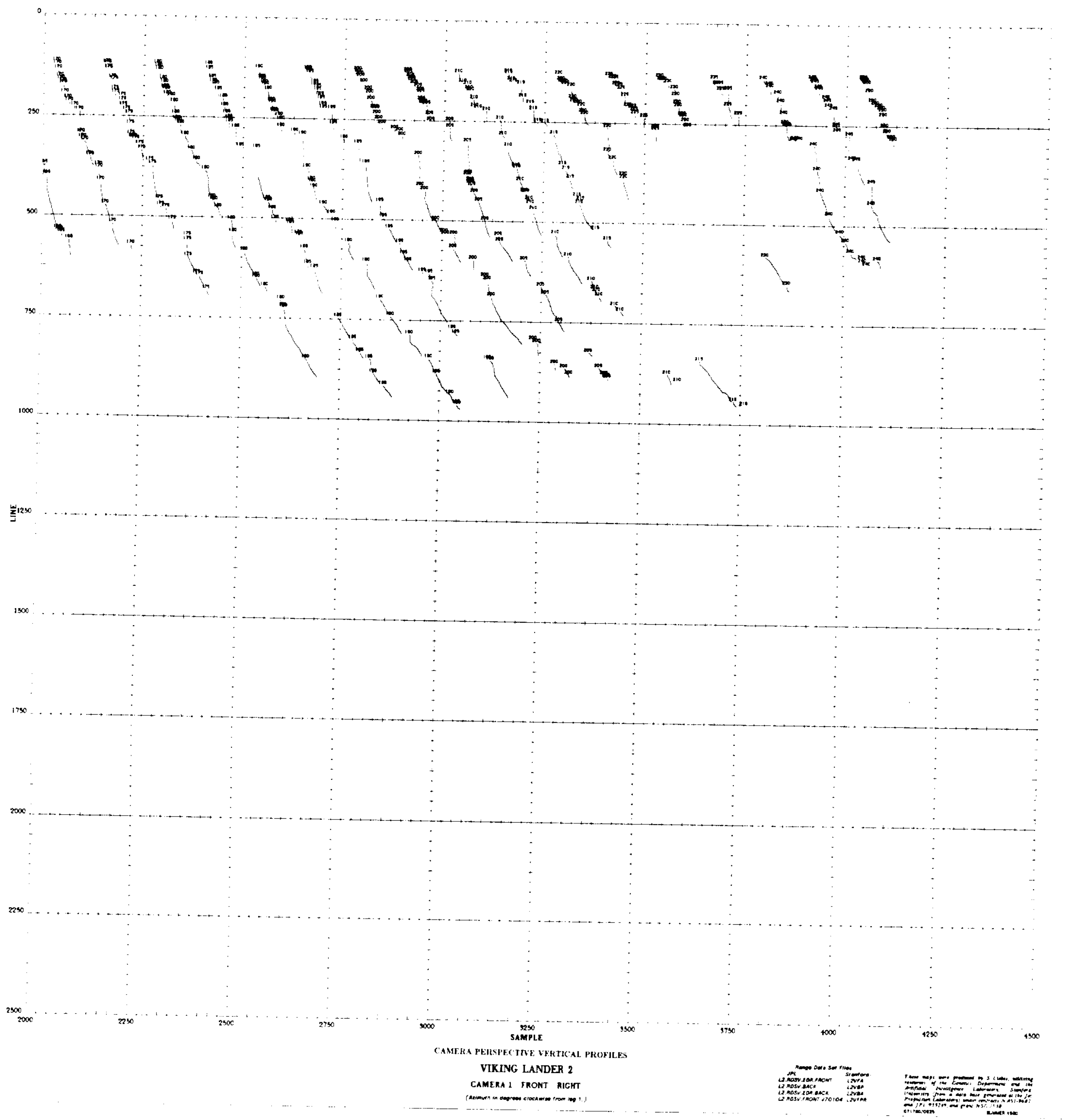


Fig. 62. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), front right quadrant.

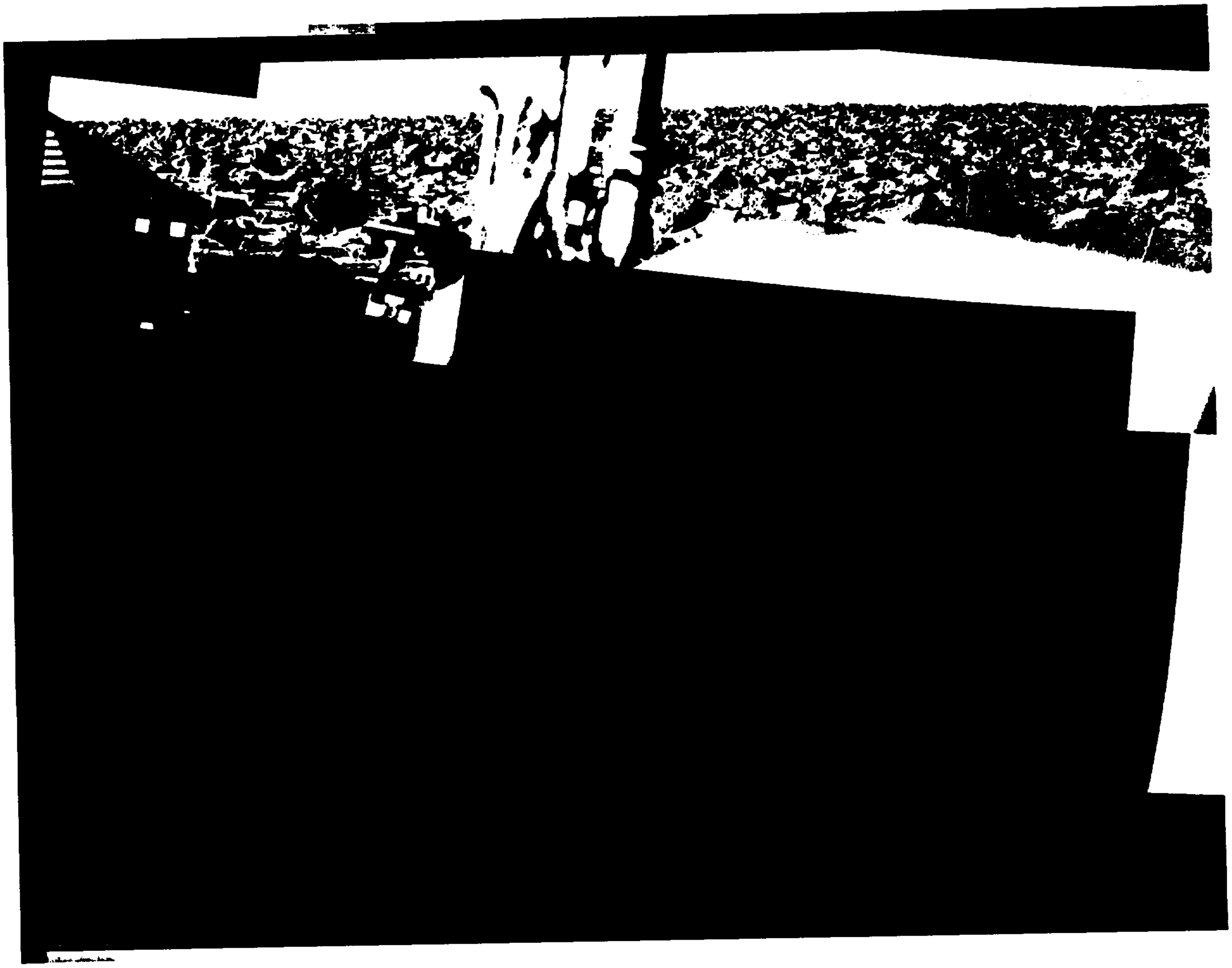


Fig. 63. Vertical Profile Overlay Mosaic: Camera 1 (right), back left quadrant — from IPL PIC ID 79/04/04/041347.

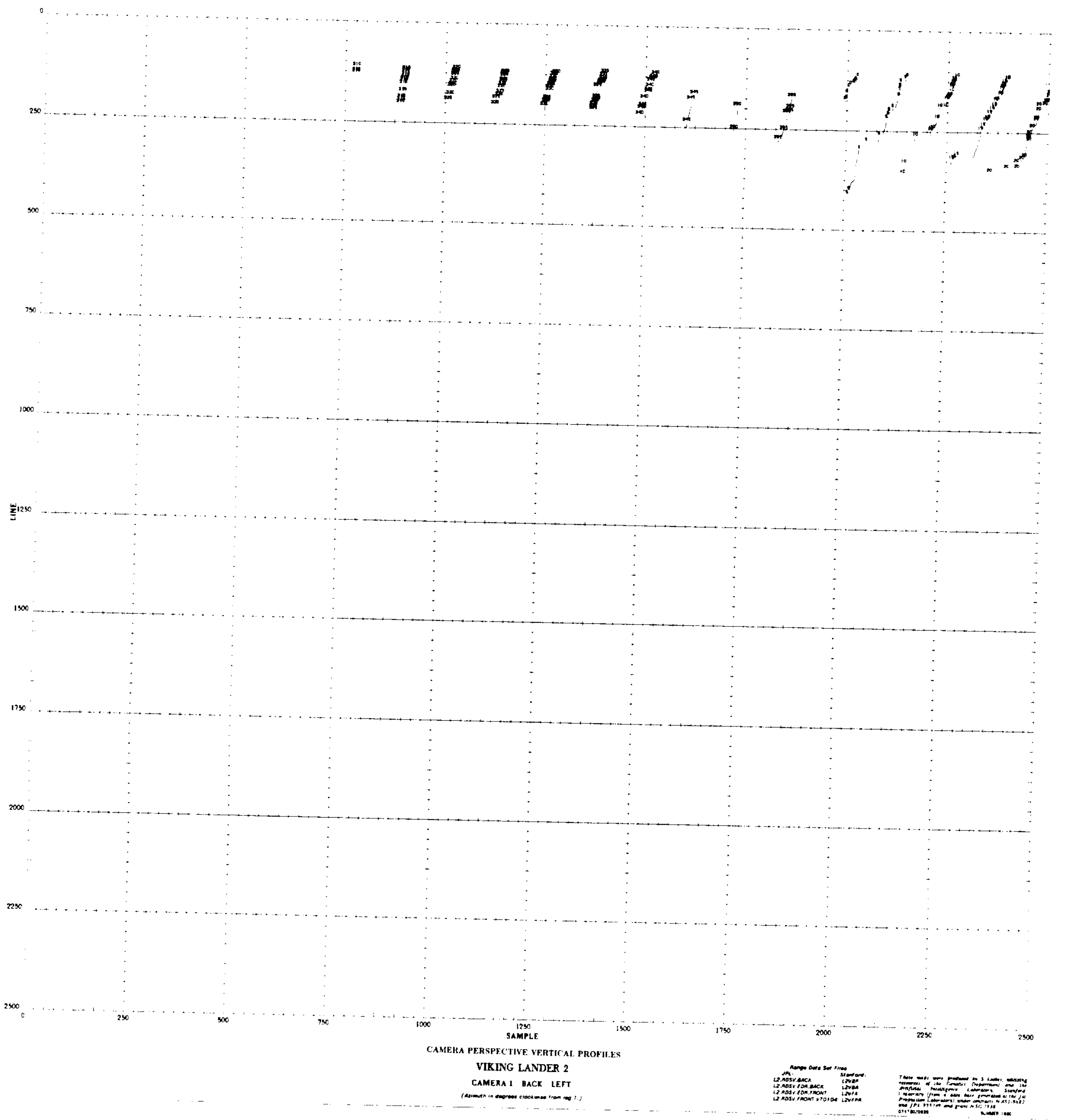


Fig. 64. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), back left quadrant.

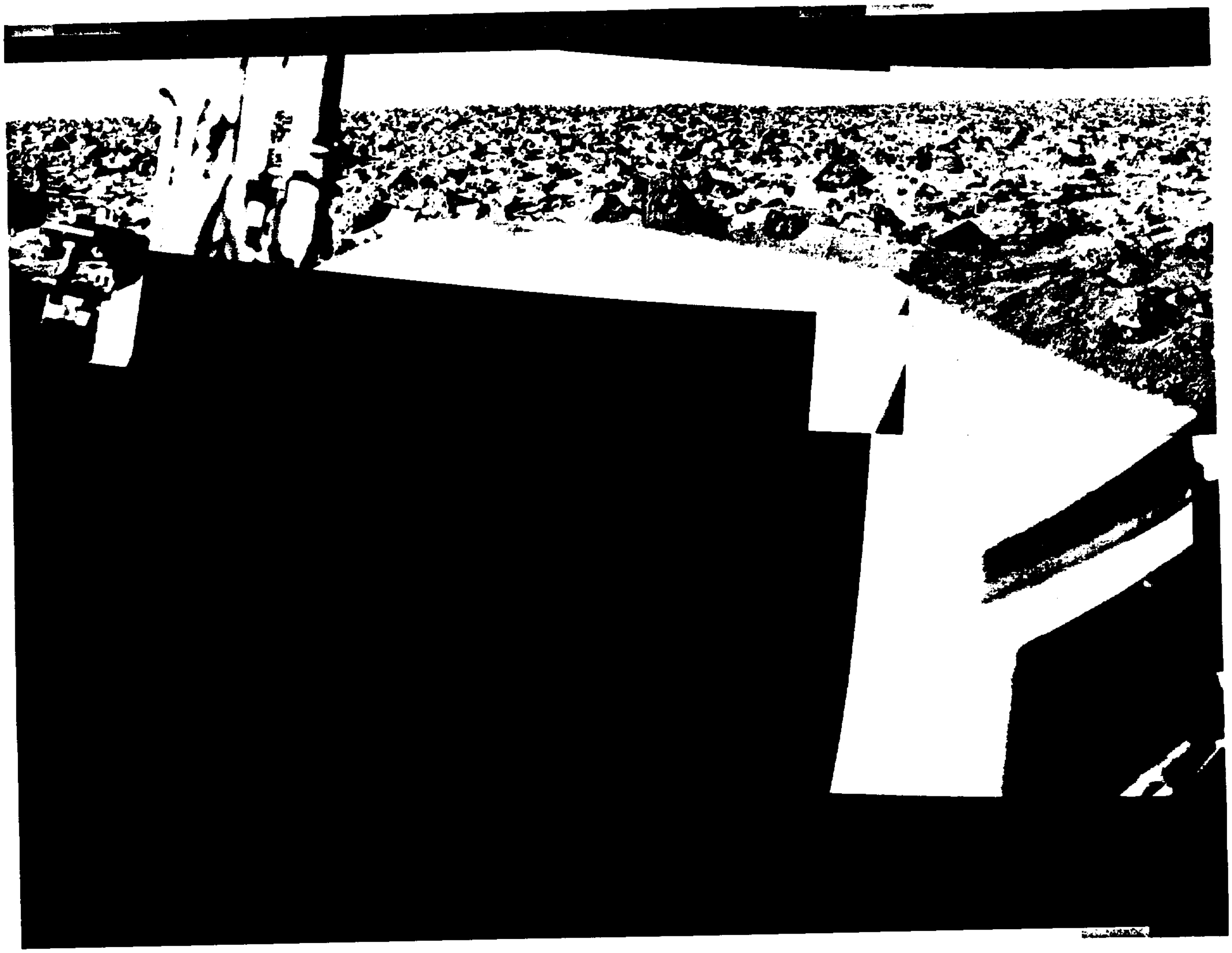


Fig. 65. Vertical Profile Overlay Mosaic: Camera 1 (right), back right quadrant — from IPL PIC ID 79/04/04/041347.

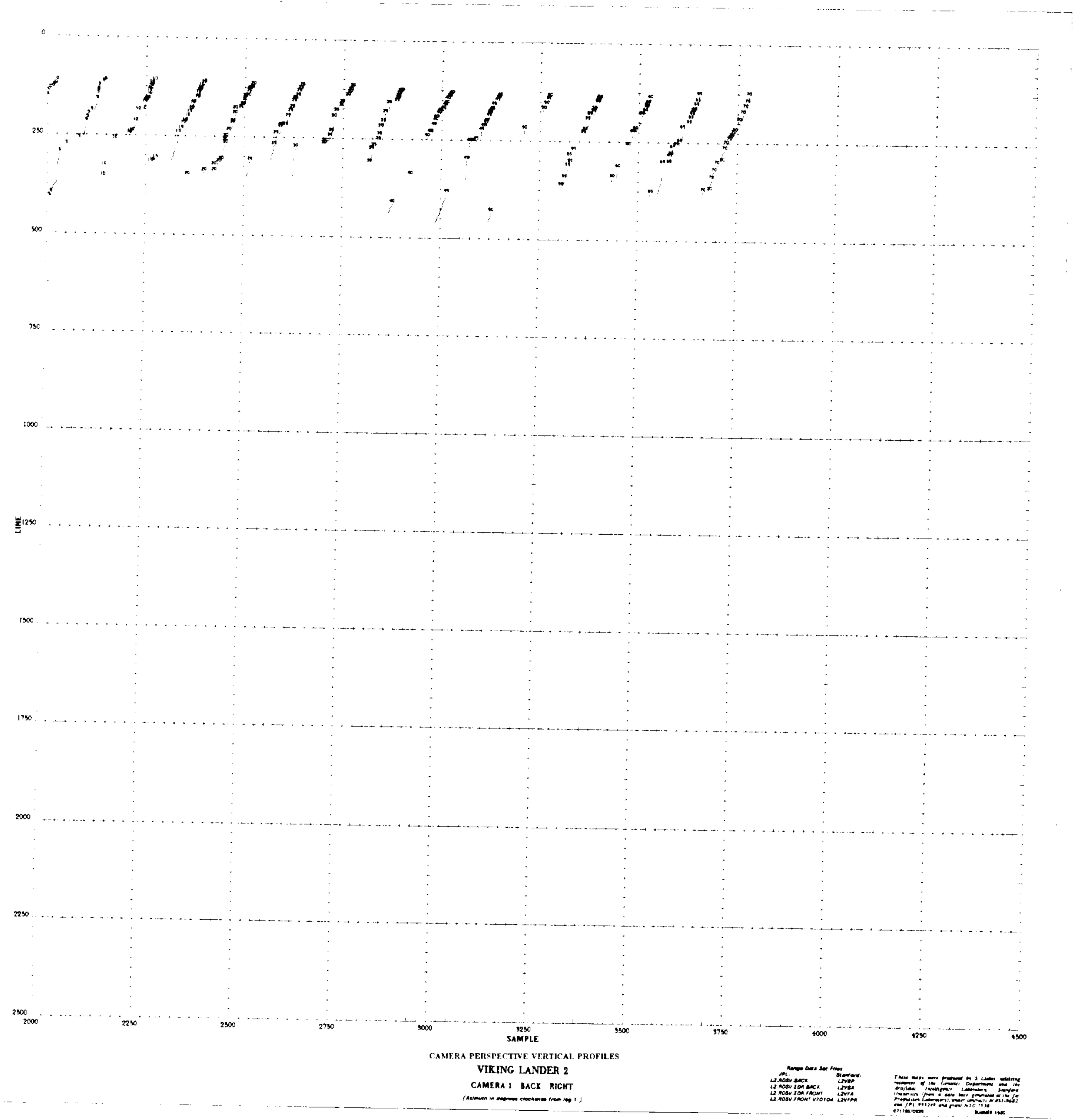
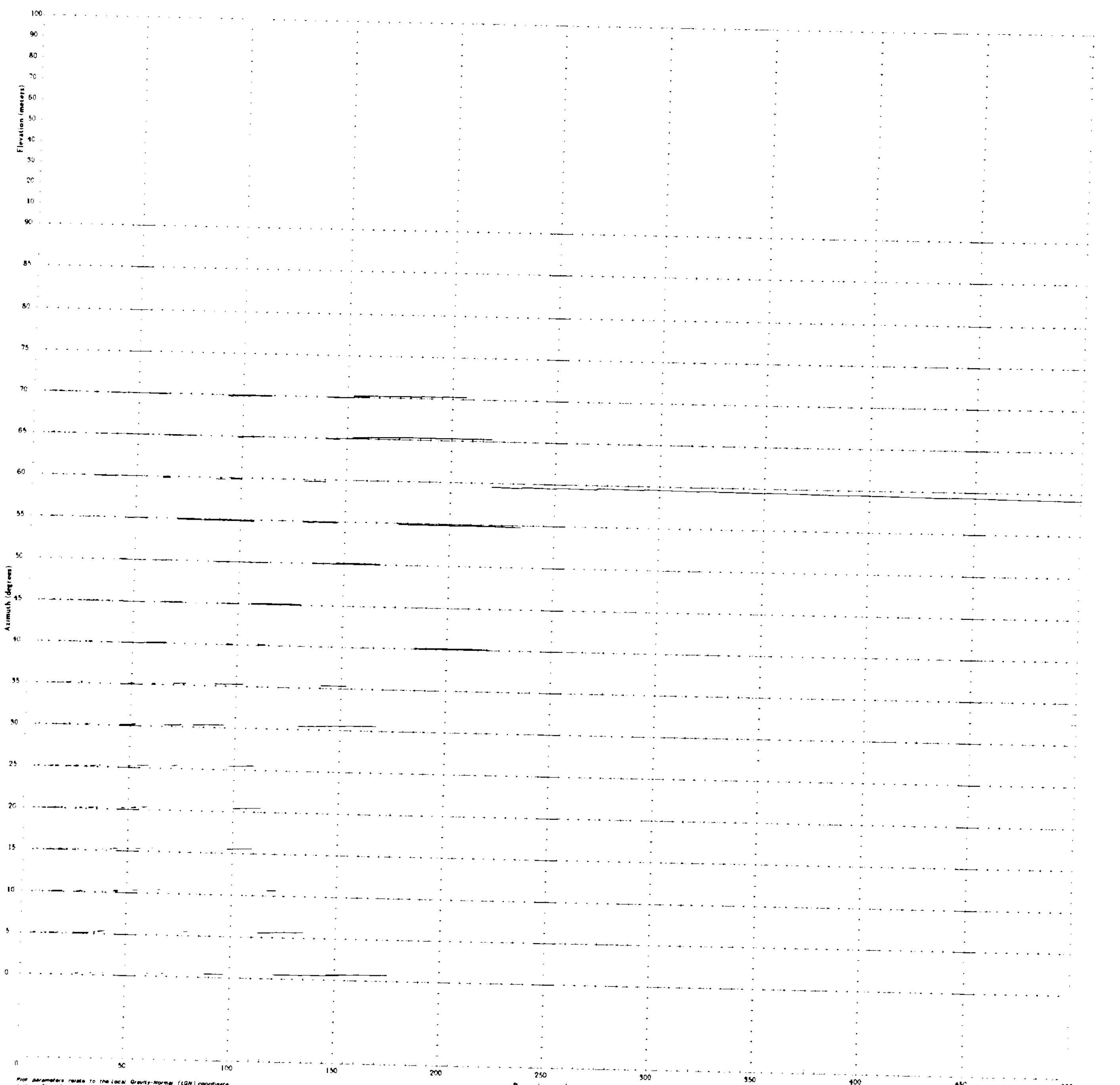


Fig. 66. Camera Perspective Annotated Elevation Vertical Profile Lines: Camera 1 (left), back right quadrant.

7.3 Vertical Profile Sheet Collection

This section contains the vertical profile sheet collection. No tabulation of the kind preceding the elevation contour maps has been prepared. The sheets are ordered as follows. First, they are grouped by quadrant, in clockwise order starting from the back left quadrant (0 - 90°), then within each quadrant by order of decreasing scale number, and within each scale by order of increasing range.



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

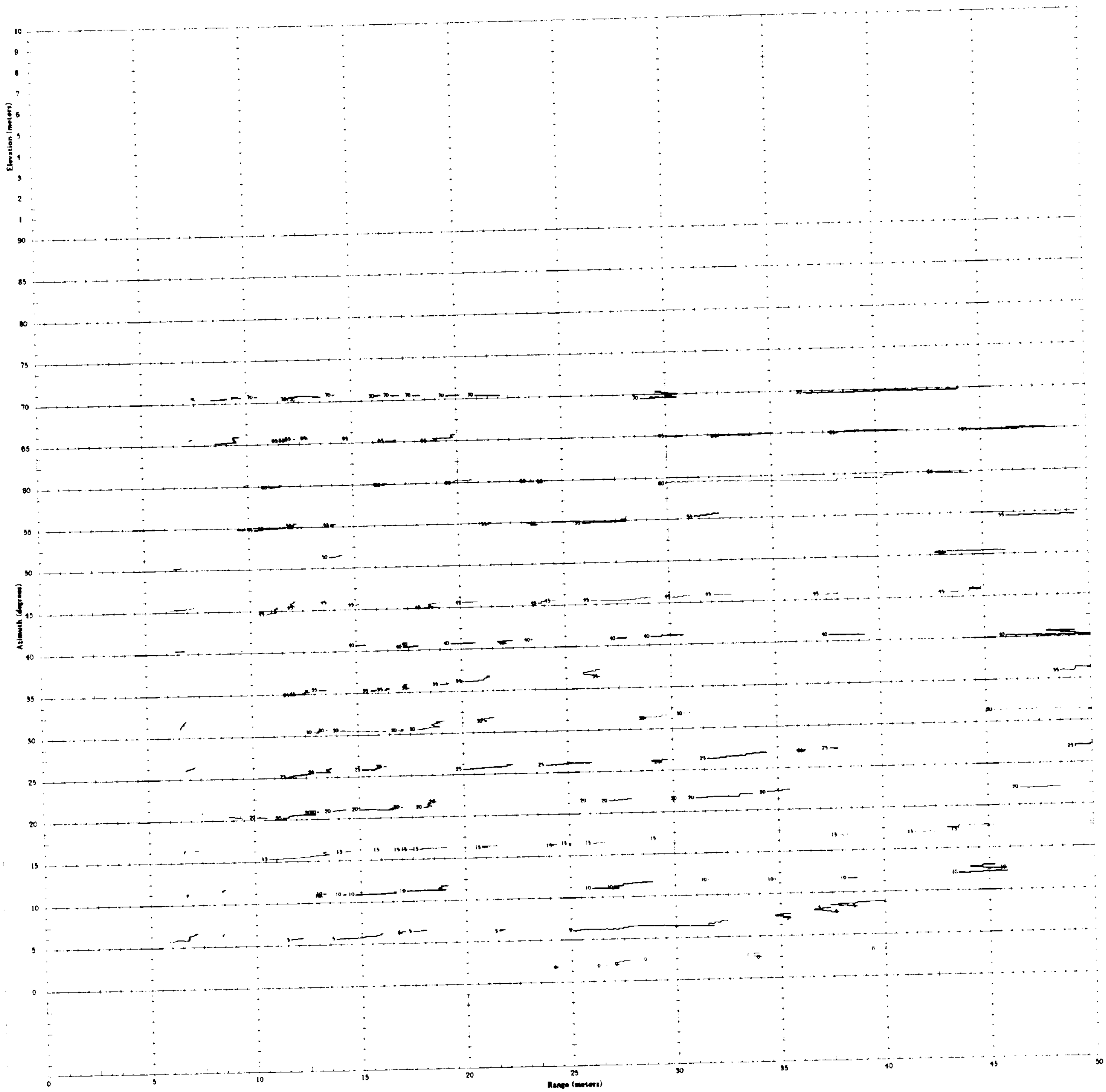
SCALE 1 : 1000 RANGE 0 TO 500 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L2 ADSV.EDR.FRONT	L2VFA
L2 ADSV BACK	L2VBP
L2 ADSV EDR BACK	L2VBA
L2 ADSV FRONT V	L2VFAR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7538.

[illegible] MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

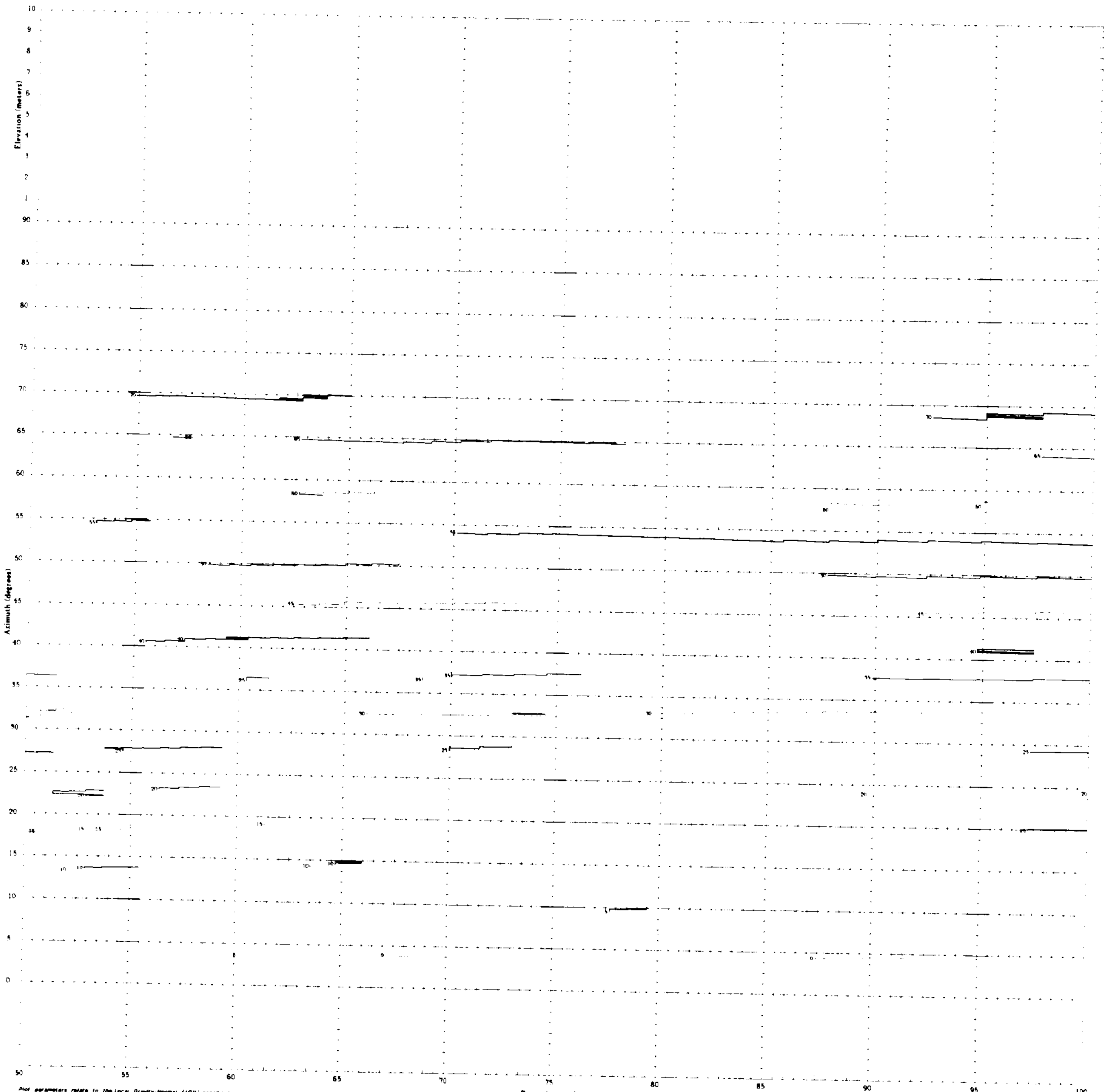
SCALE 1 : 100 RANGE 0 TO 50 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts N ASI-9682 and JPL 955249, and grant NSG 7538.

091980(2515 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The X-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

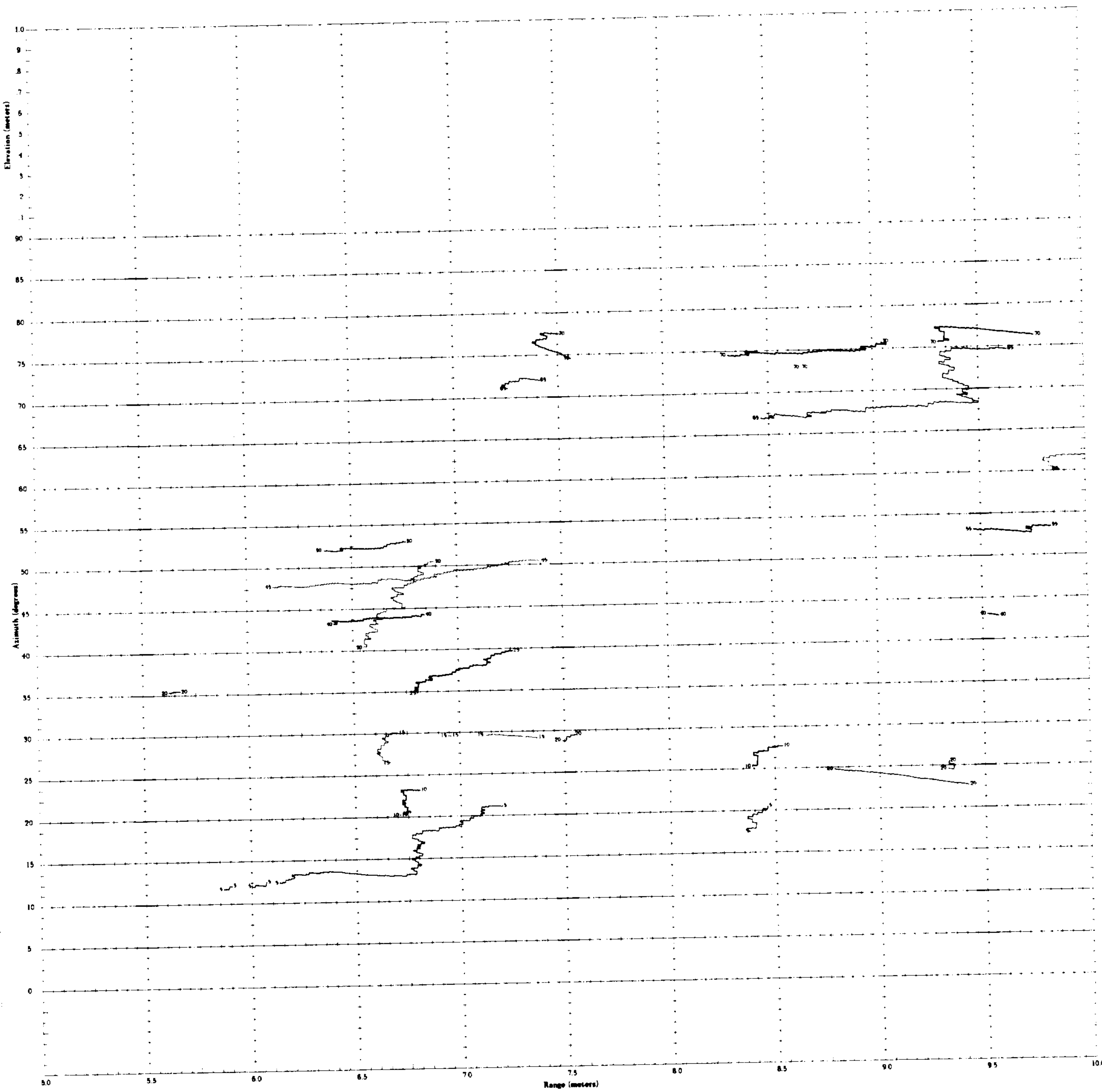
SCALE 1 : 100   RANGE 50 TO 100 METERS   0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV EDR FRONT	L2VFA
L2.RDSV BACK	L2VBP
L2.RDSV EDR BACK	L2VBA
L2.RDSV FRONT V-	L2VFPR

These maps were produced by S. Liebes, working [illegible] of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 955249, and grant NSG 7538

051 9806 7515   MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Y-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

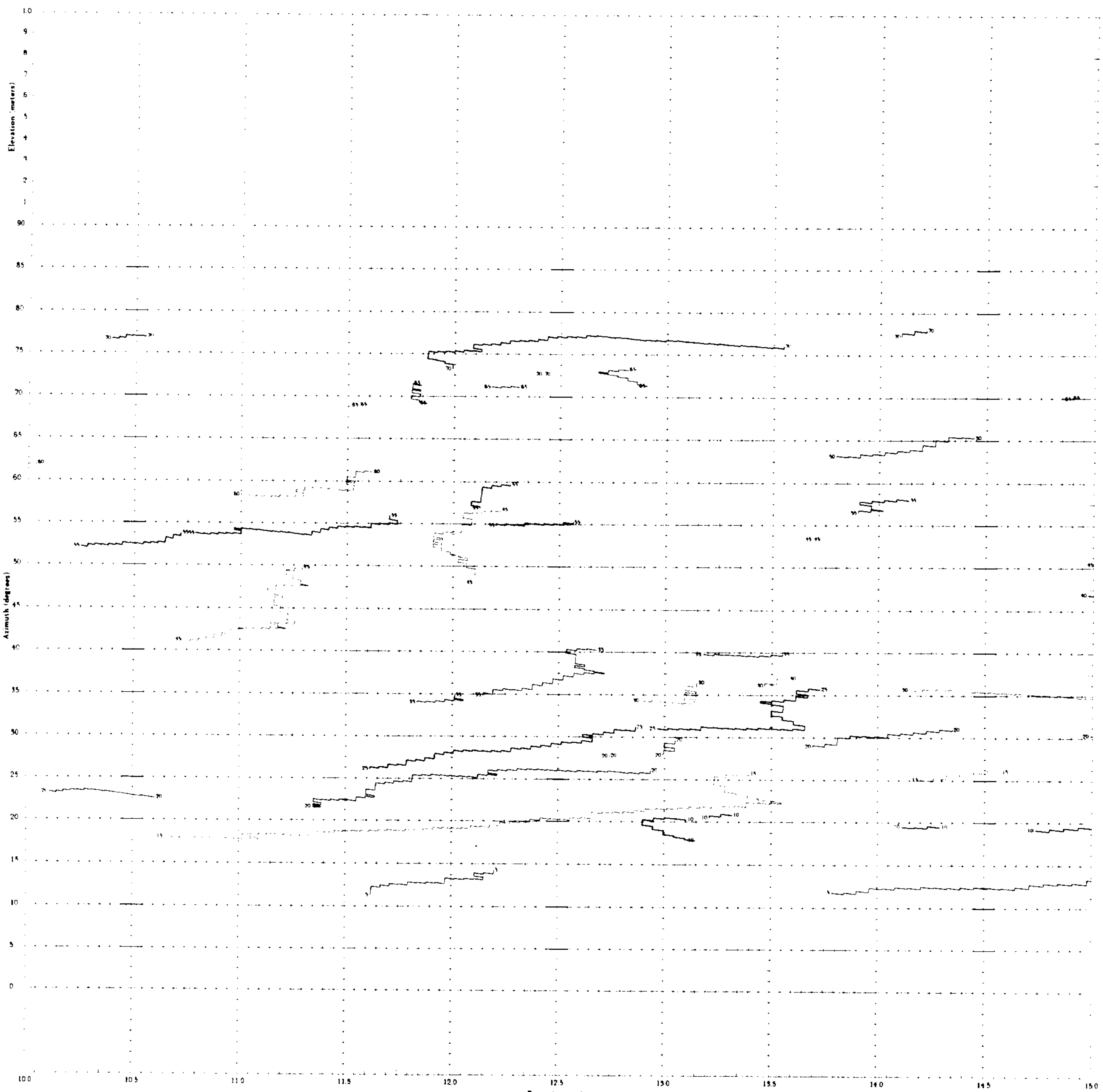
SCALE 1 : 10 RANGE 5 TO 10 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSC 7538

[illegible] MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The X-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative X axis.

VIKING LANDER 2

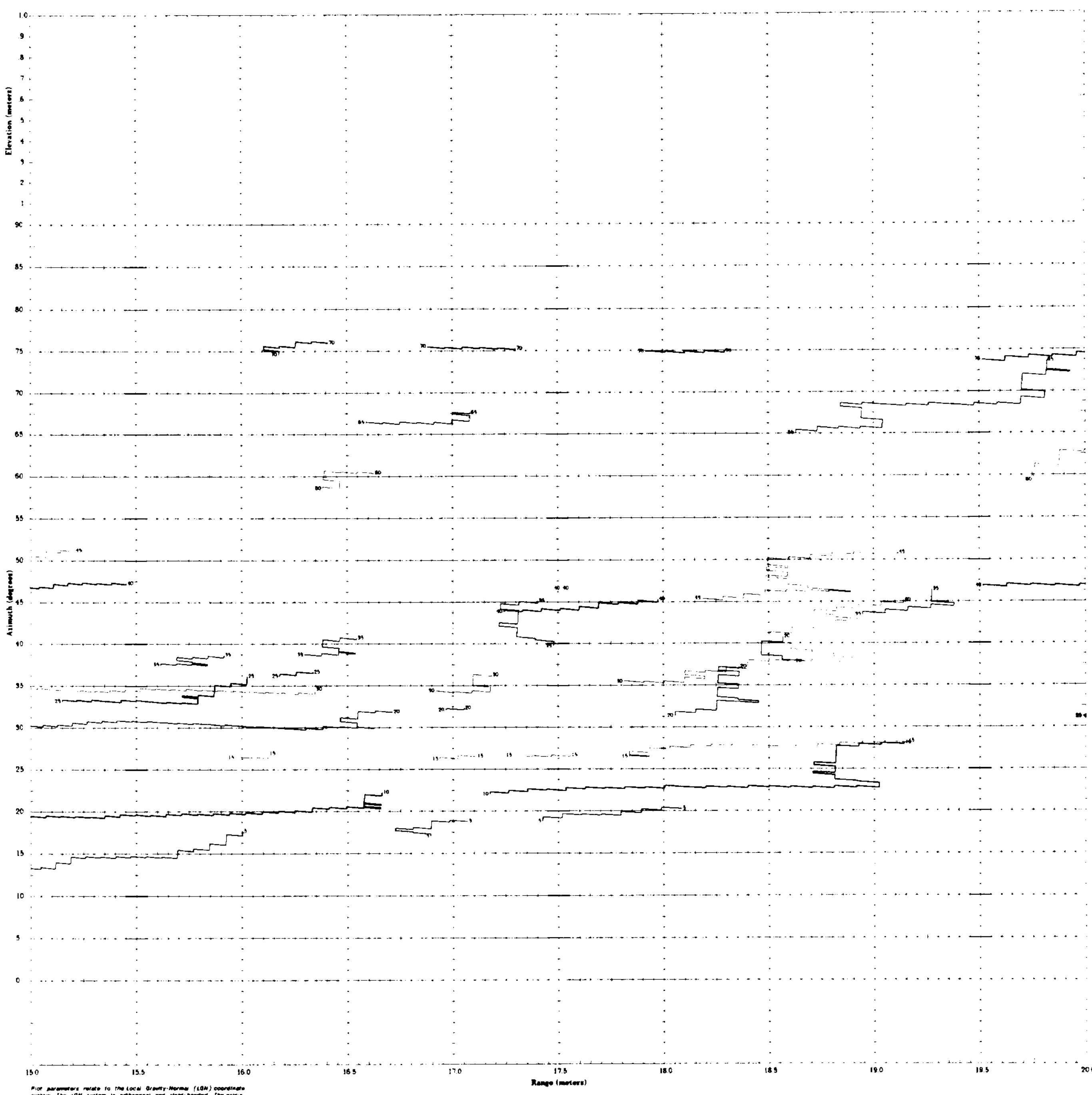
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 0 TO 90 DEGREES

Range Data Set Files	
JPL:	Stanford:
L2.ADSV.EOR.FRONT	L2VFA
L2.ADSV.BACK	L2VBP
L2.ADSV.EOR.BACK	L2VBA
L2.ADSV.FRONT V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contract NAS1-9682 and JPL 955149, and grant NSG 7518.

DS1980/29.5 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

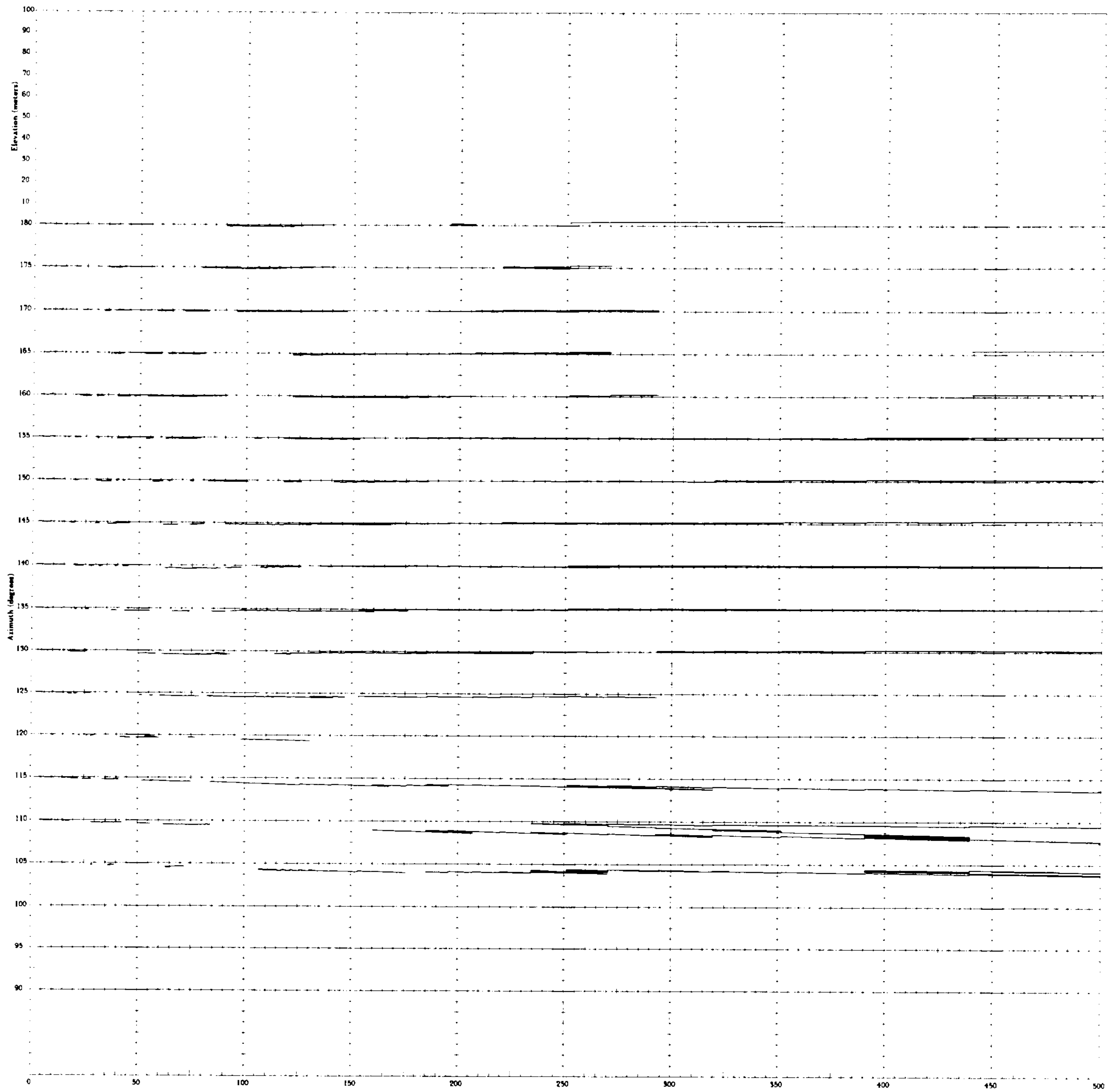
SCALE 1 : 10 RANGE 15 TO 20 METERS 0 TO 90 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contract NAS1-9683 and JPL 955249, and grant NSG 7148.

[illegible] MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

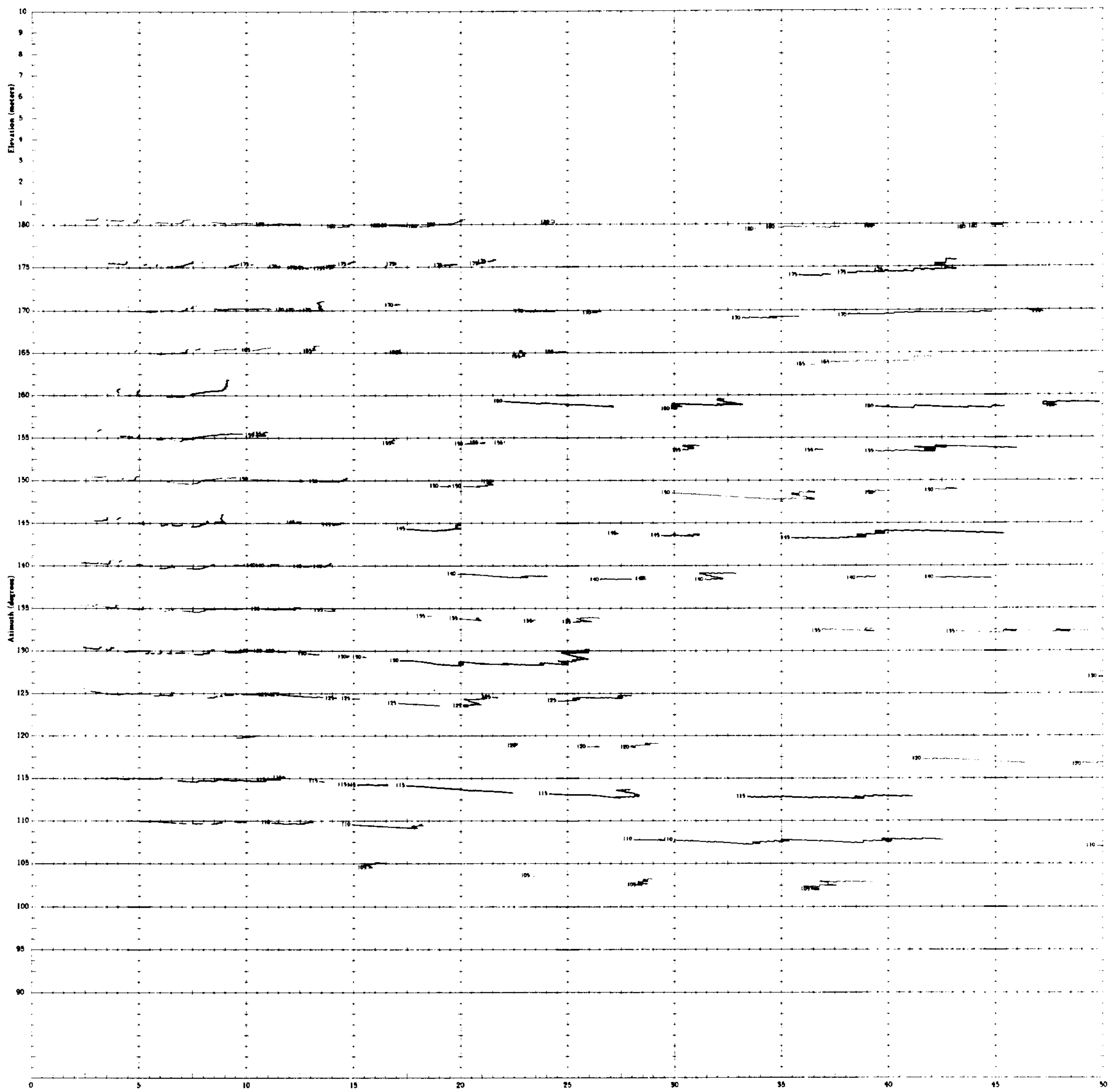
SCALE 1 : 1000 RANGE 0 TO 500 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L2.ROSV.EDR FRONT	L2VFA
L2.ROSV.BACK	L2VBP
L2.ROSV.EDR BACK	L2VBA
L2.ROSV.FRONT V-	L2VFPR

These maps were produced by S. Liebes utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249 and grant NSF 7598

031380/25.5 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

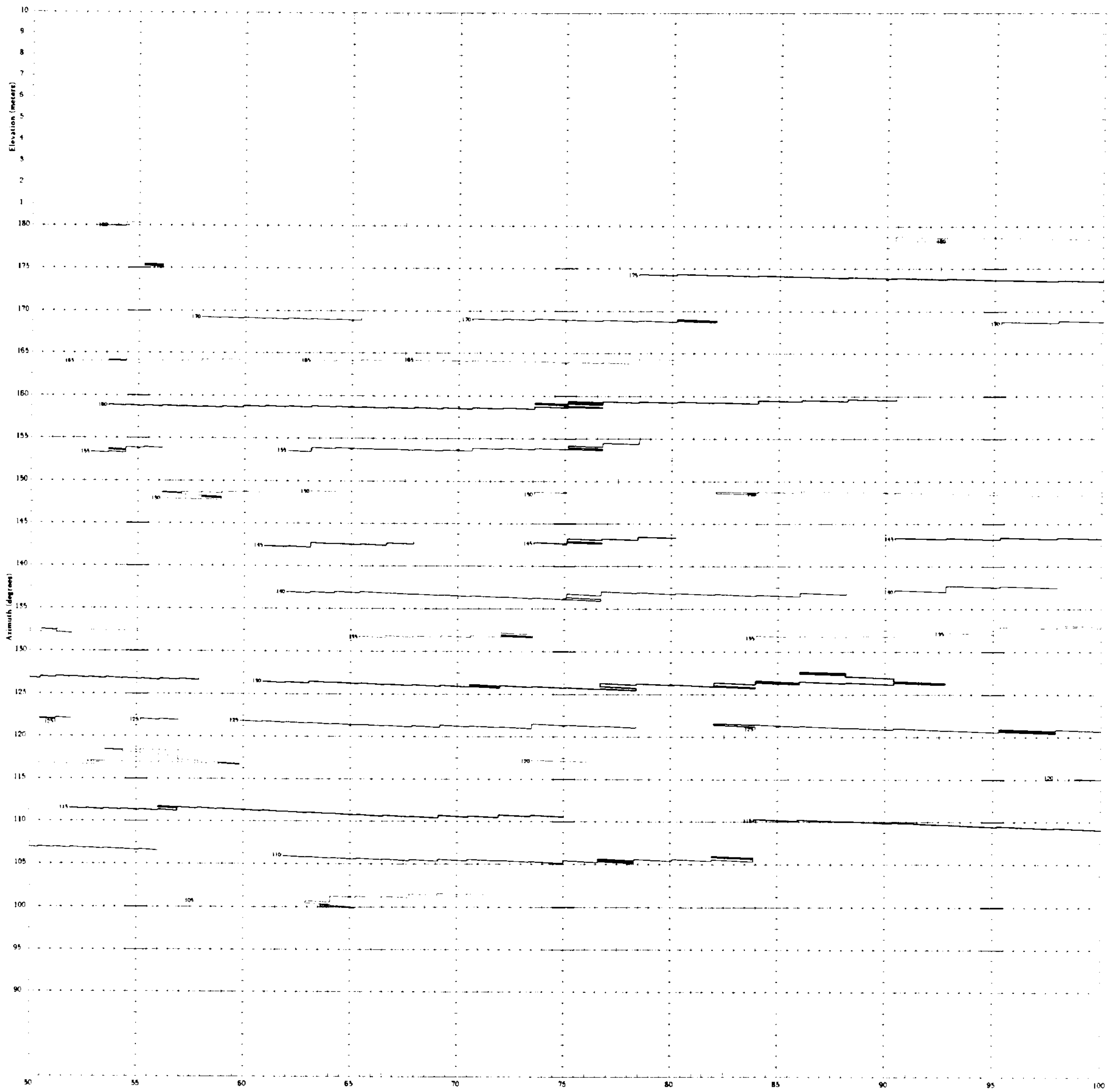
SCALE 1 : 100 RANGE 0 TO 50 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSC 7538

091800Z315 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

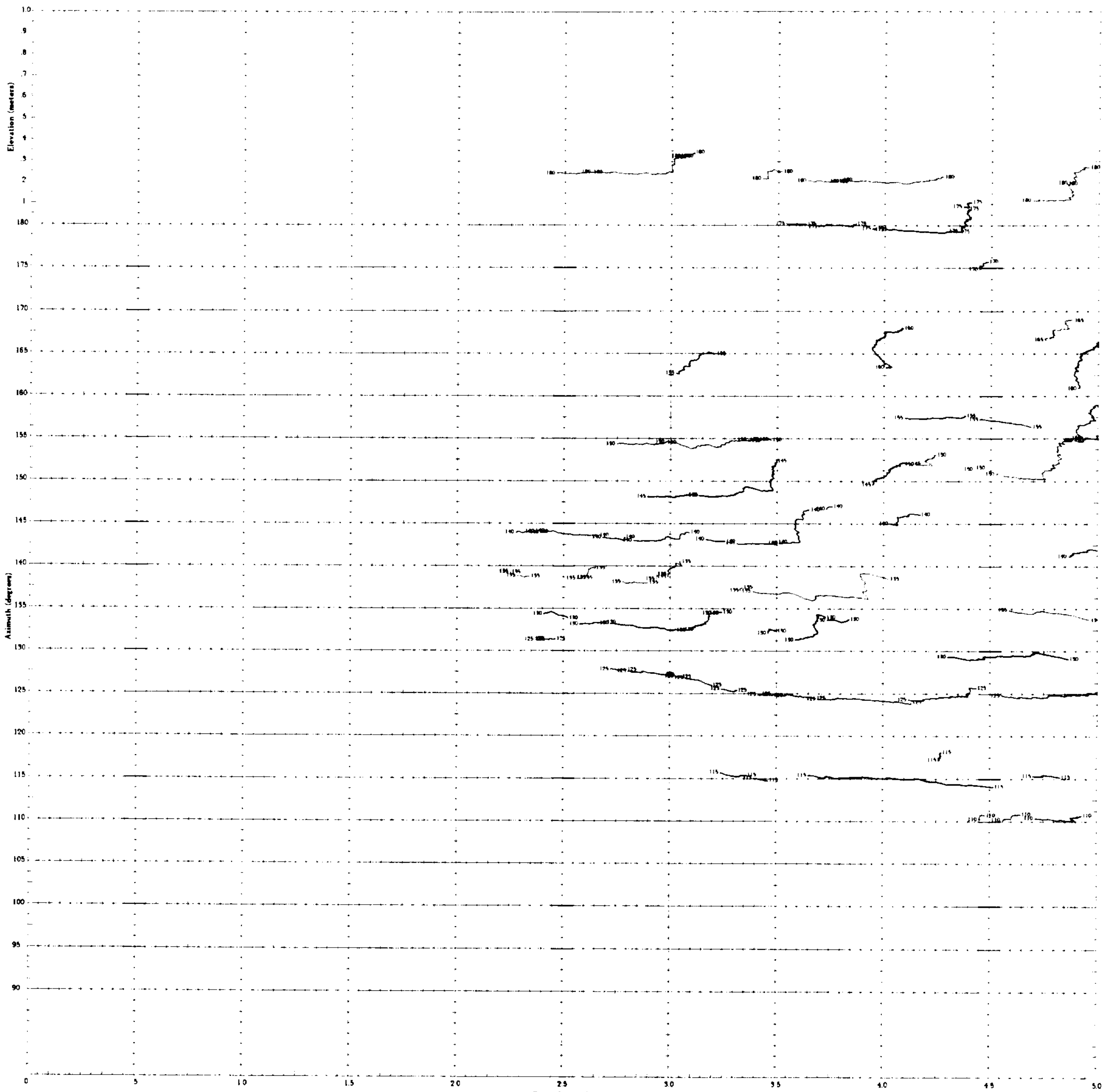
SCALE 1 : 100 RANGE 50 TO 100 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9682 and JPL 953249, and grant NSG-2538.

[illegible] MARCH [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

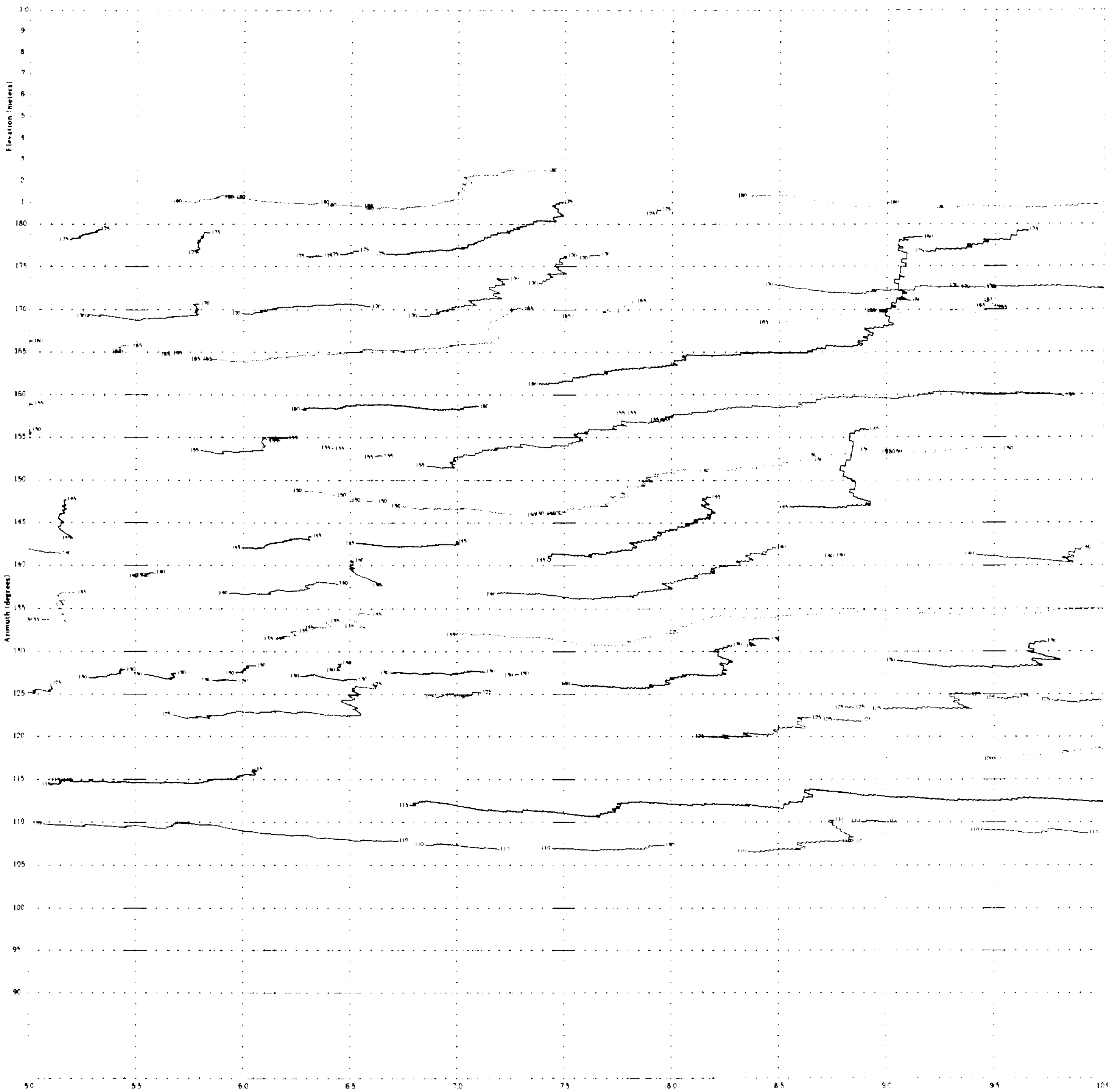
SCALE 1 : 10 RANGE 0 TO 5 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by J. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts NAS1-9682 and JPL 953249, and grant NSG 7138.

051180/2115 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The X-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

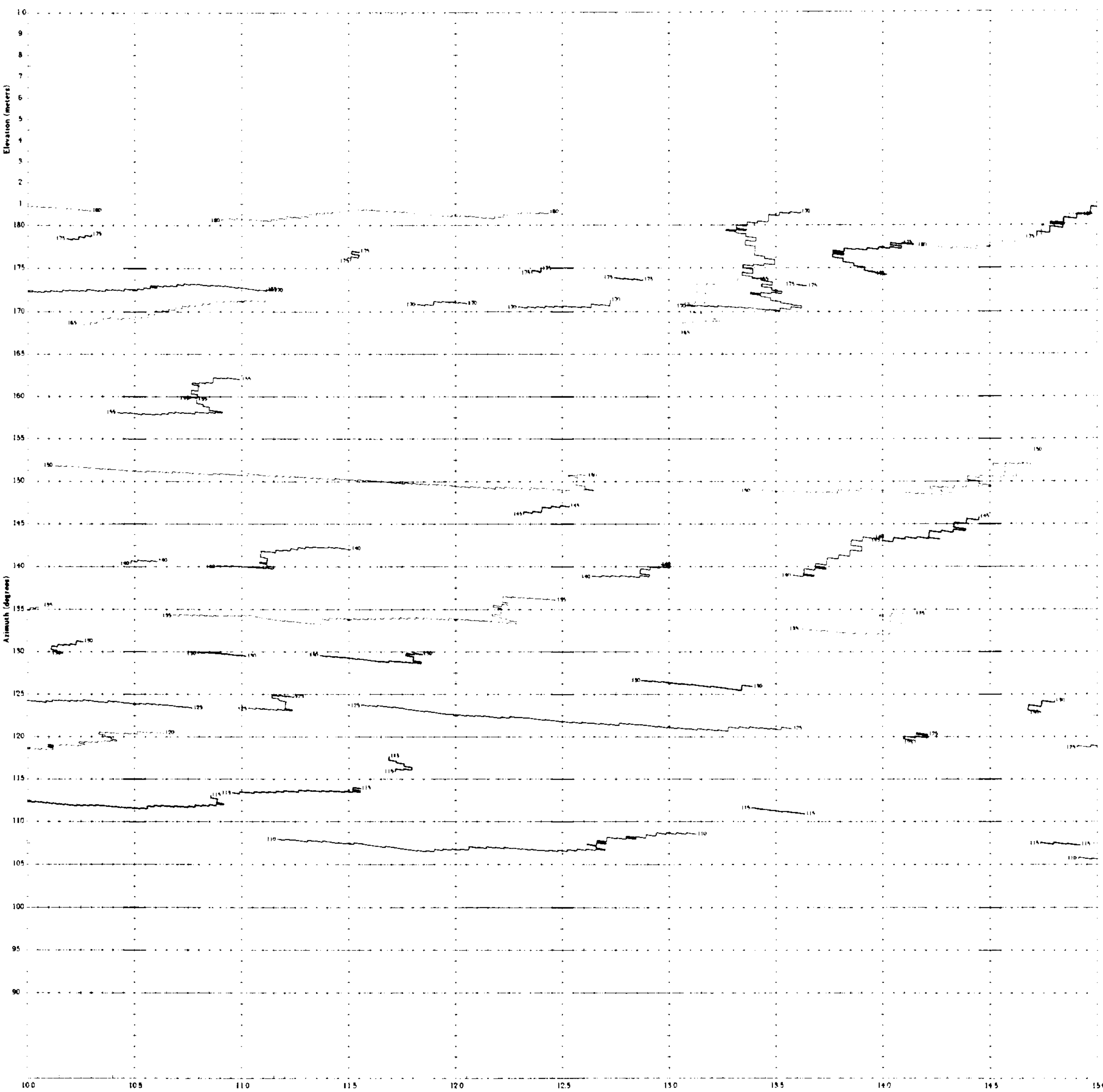
SCALE 1 : 10 RANGE 5 TO 10 METERS 90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L2 RDSV EDR FRONT	L2VFA
L2 RDSV BACK	L2VBP
L2 RDSV EDR BACK	L2VBA
L2 RDSV FRONT V	L2VFPP

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory) under contracts [illegible] and JPL 955249 and grant [illegible]

[illegible] MARCH [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10   RANGE 10 TO 15 METERS   90 TO 180 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EOR FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EOR BACK	L2VBA
L2.RDSV.FRONT V	L2VFPR

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DEL 800/2915   MARCH 1980

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 15 TO 20 METERS 90 TO 180 DEGREES

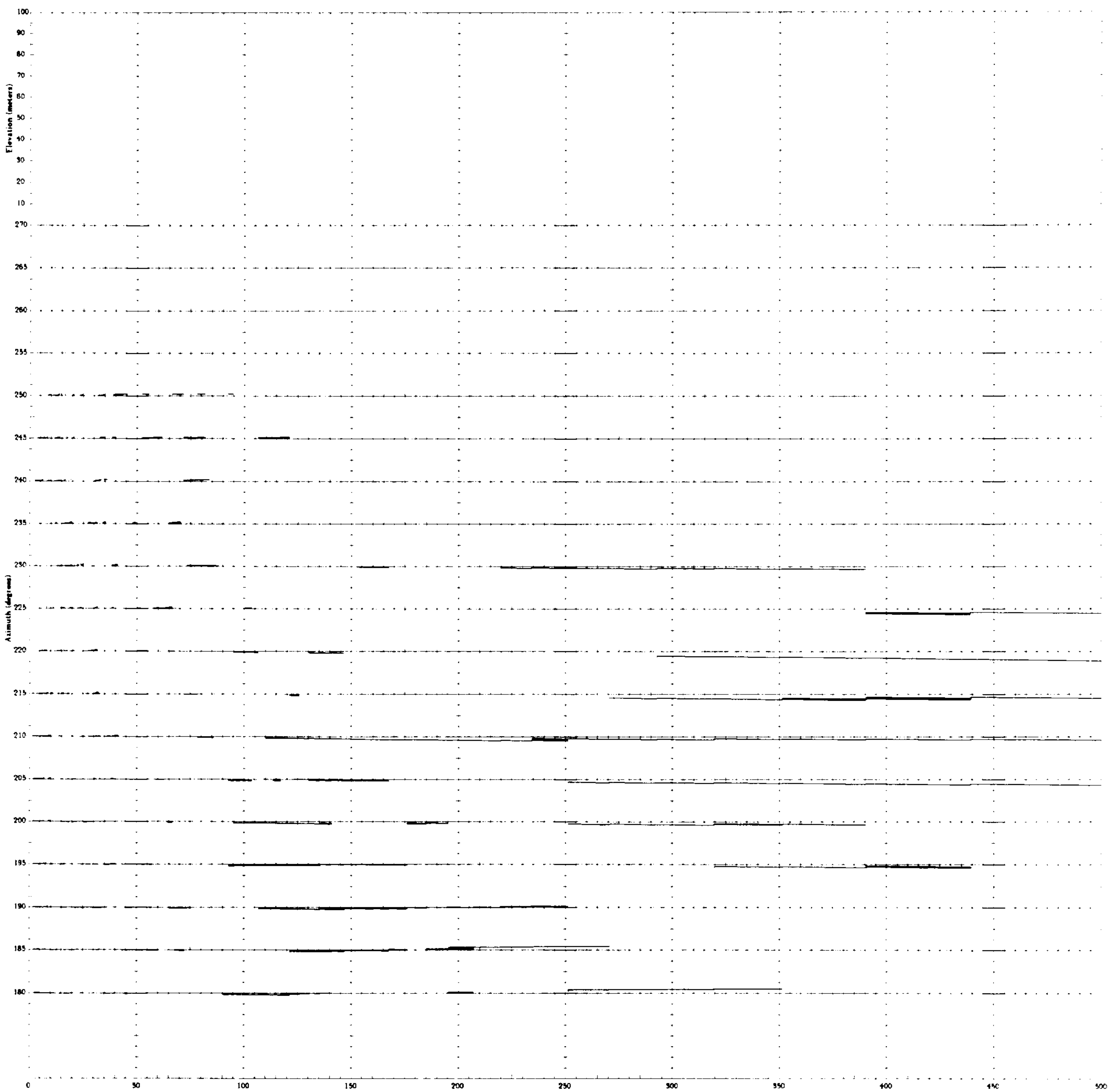
Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPP

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts [illegible] and JPL [illegible], and grant NSG [illegible].

[illegible] MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

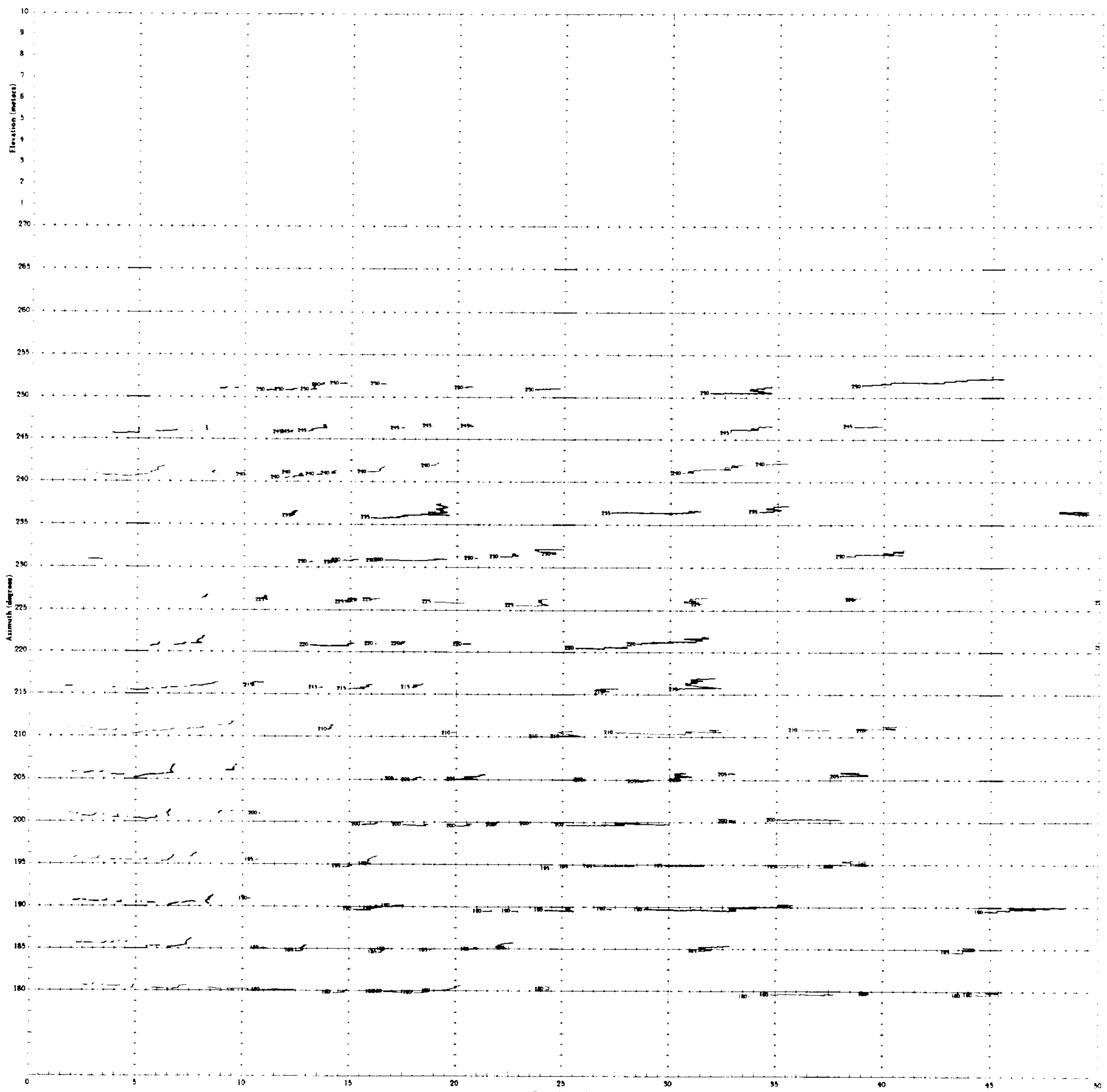
SCALE 1 : 1000 RANGE 0 TO 500 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.ROSV.EOR.FRONT	L2VFA
L2.ROSV.BACK	L2VBP
L2.ROSV.EOR.BACK	L2VBA
L2.ROSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1 9682 and JPL 955349 and grant NSG 7518

MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 0 TO 50 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

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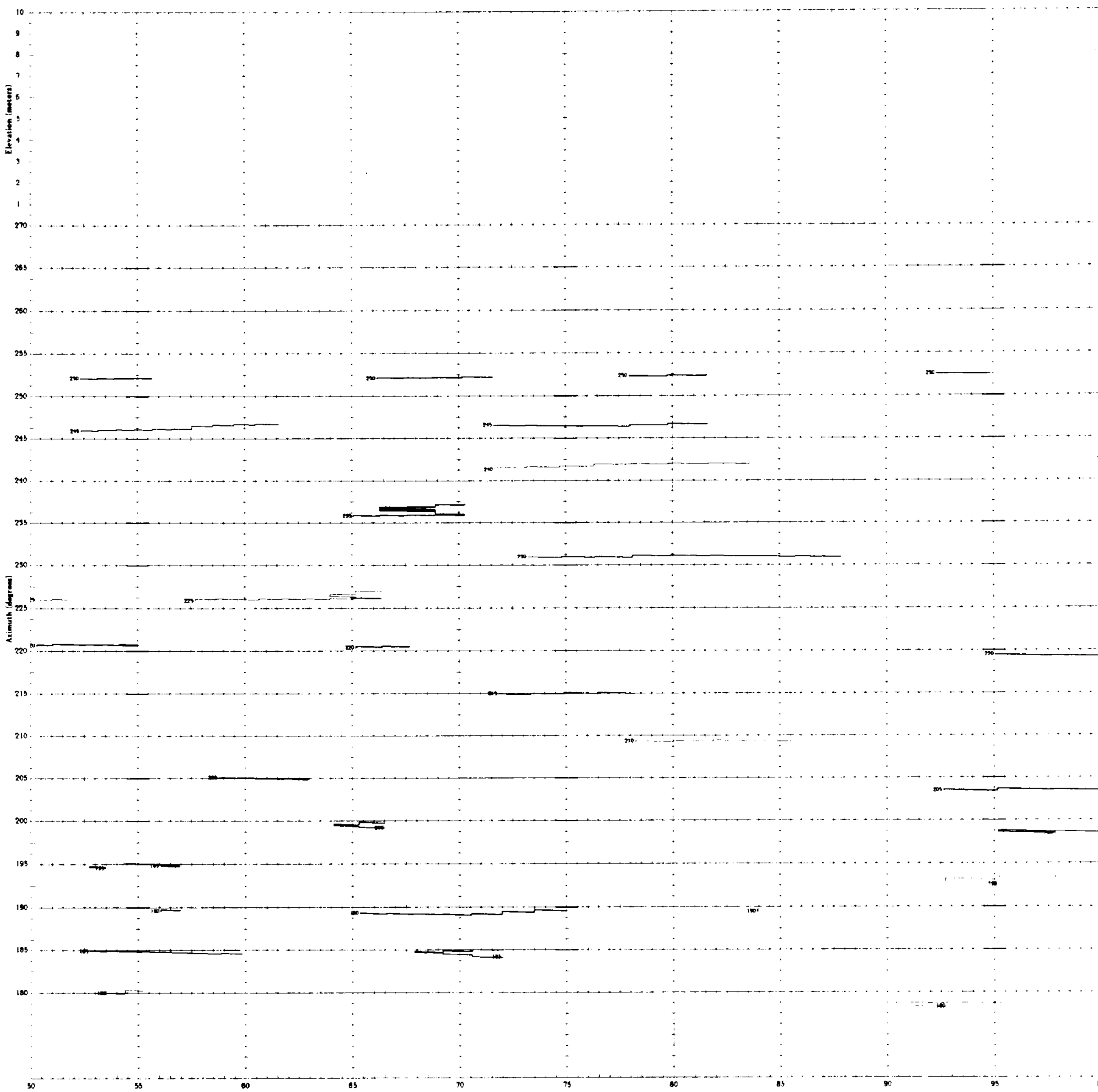
0S1980/29:5 MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 100 RANGE 50 TO 100 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.ADSV.EDR.FRONT	L2VFA
L2.ADSV.BACK	L2VBP
L2.ADSV.EDR.BACK	L2VBA
L2.ADSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7336.

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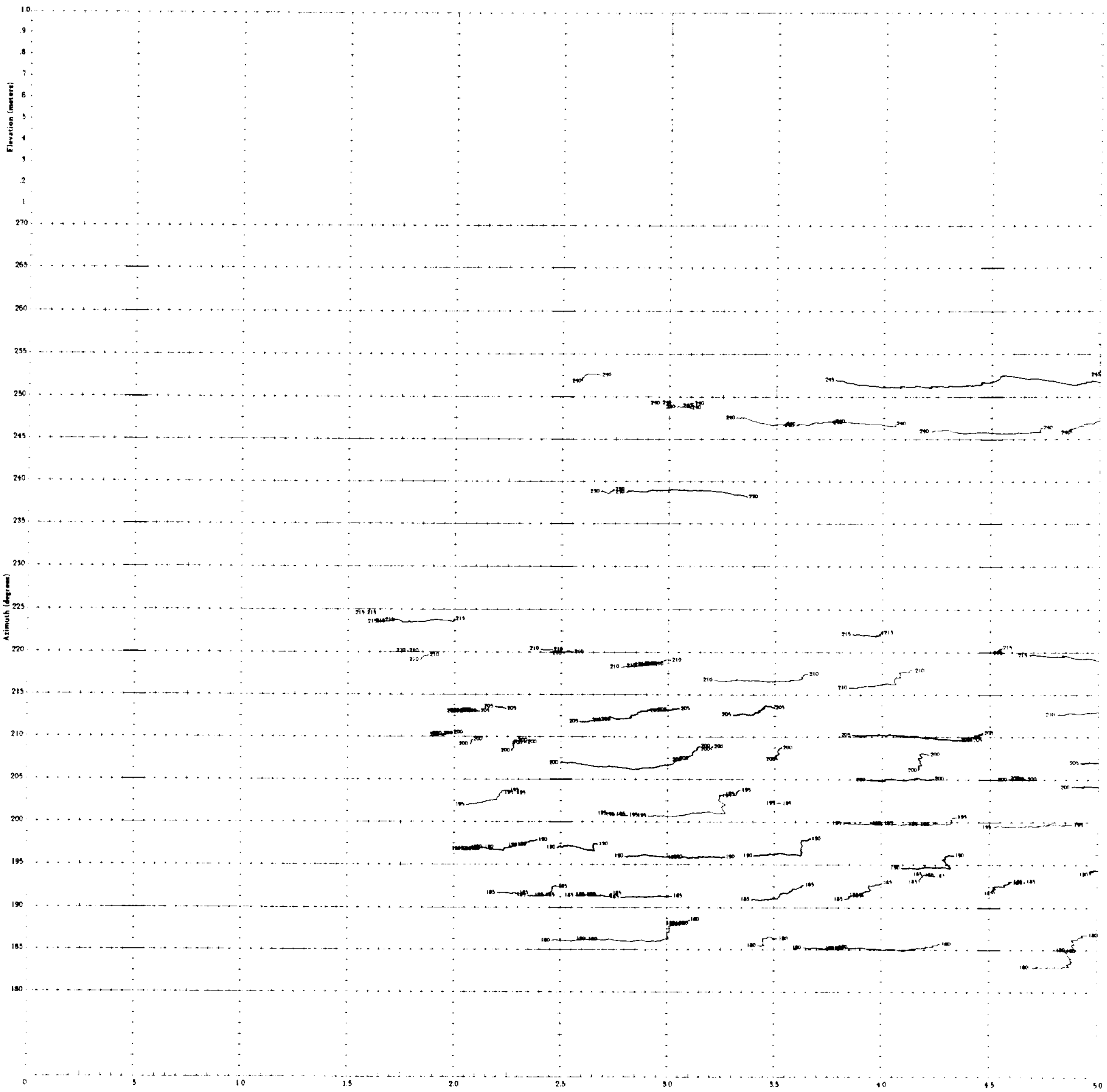


Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

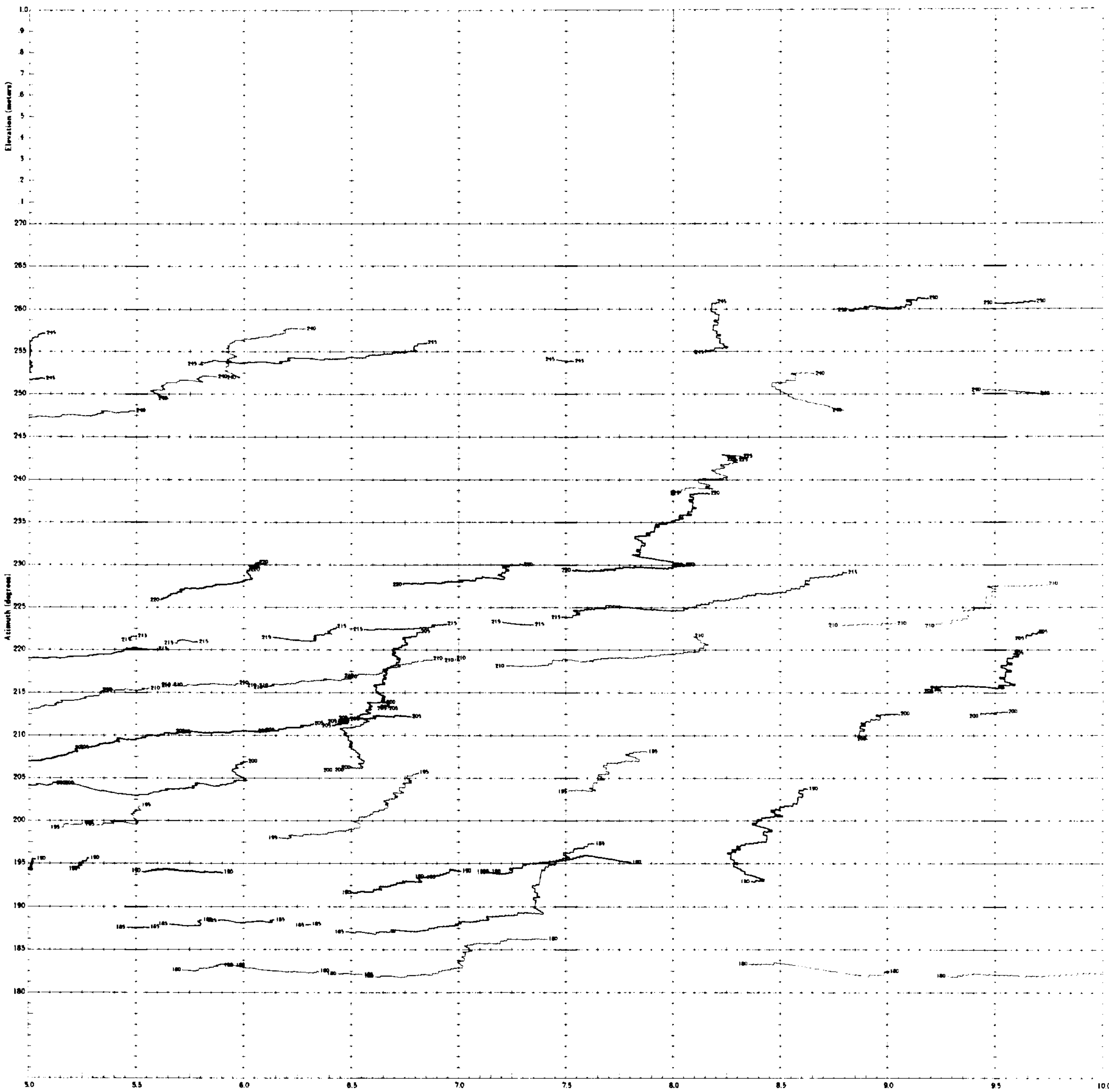
SCALE 1 : 10 RANGE 0 TO 5 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.ROSV.EDR.FRONT	L2VFA
L2.ROSV.BACK	L2VBP
L2.ROSV.EDR.BACK	L2VBA
L2.ROSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249 and grant NSG 7316.

[illegible] MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 5 TO 10 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7136

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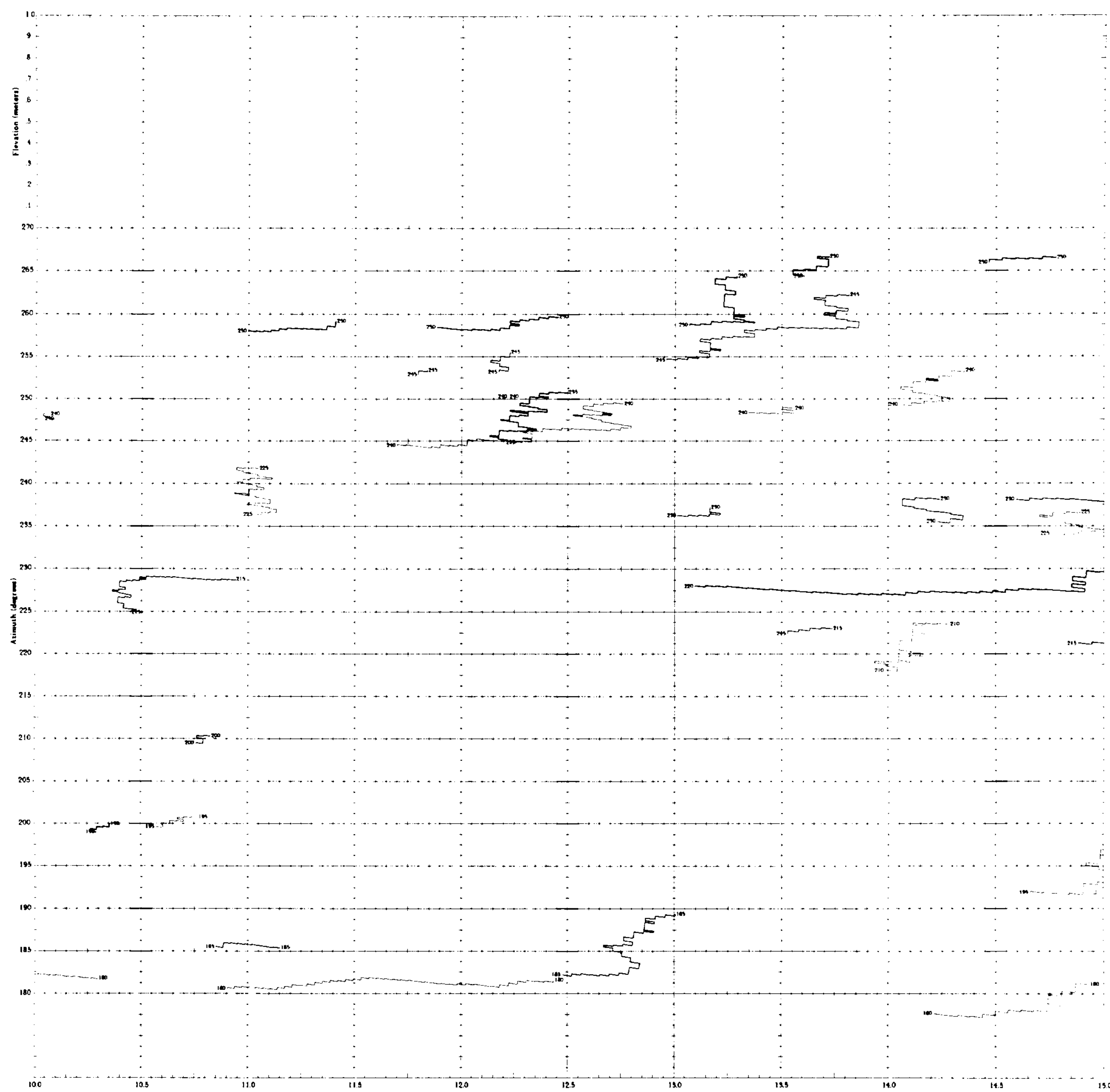


Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

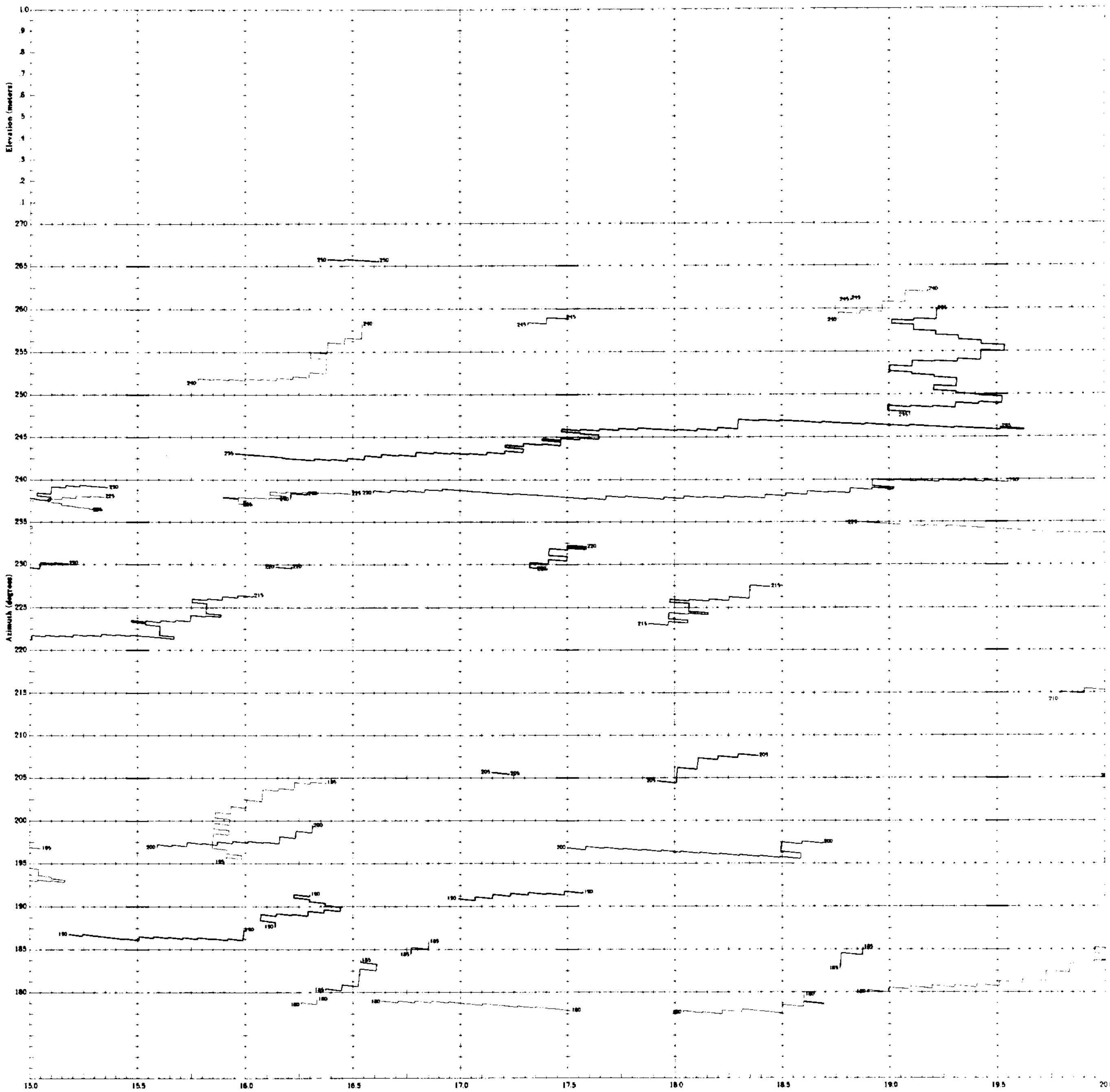
SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 180 TO 270 DEGREES

Range Data Set Files	
JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9687 and JPL 955249, and grant NSG 7538.

091980/2915 MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

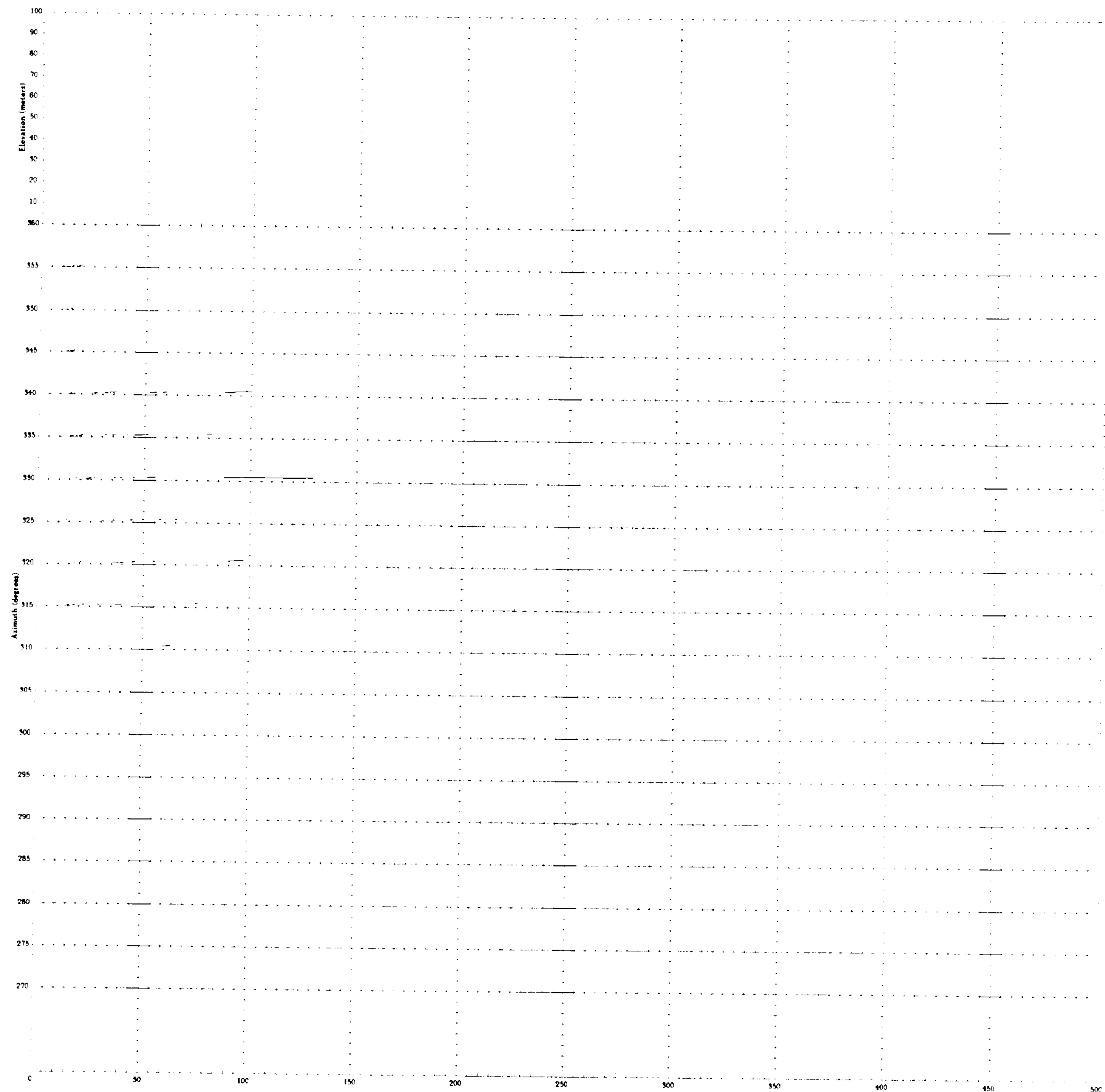
SCALE 1 : 10 RANGE 15 TO 20 METERS 180 TO 270 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V	L2VFP

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory under contracts NAS1-9683 and JPL 955749 and grant NSG 7138.

031380/2515 MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

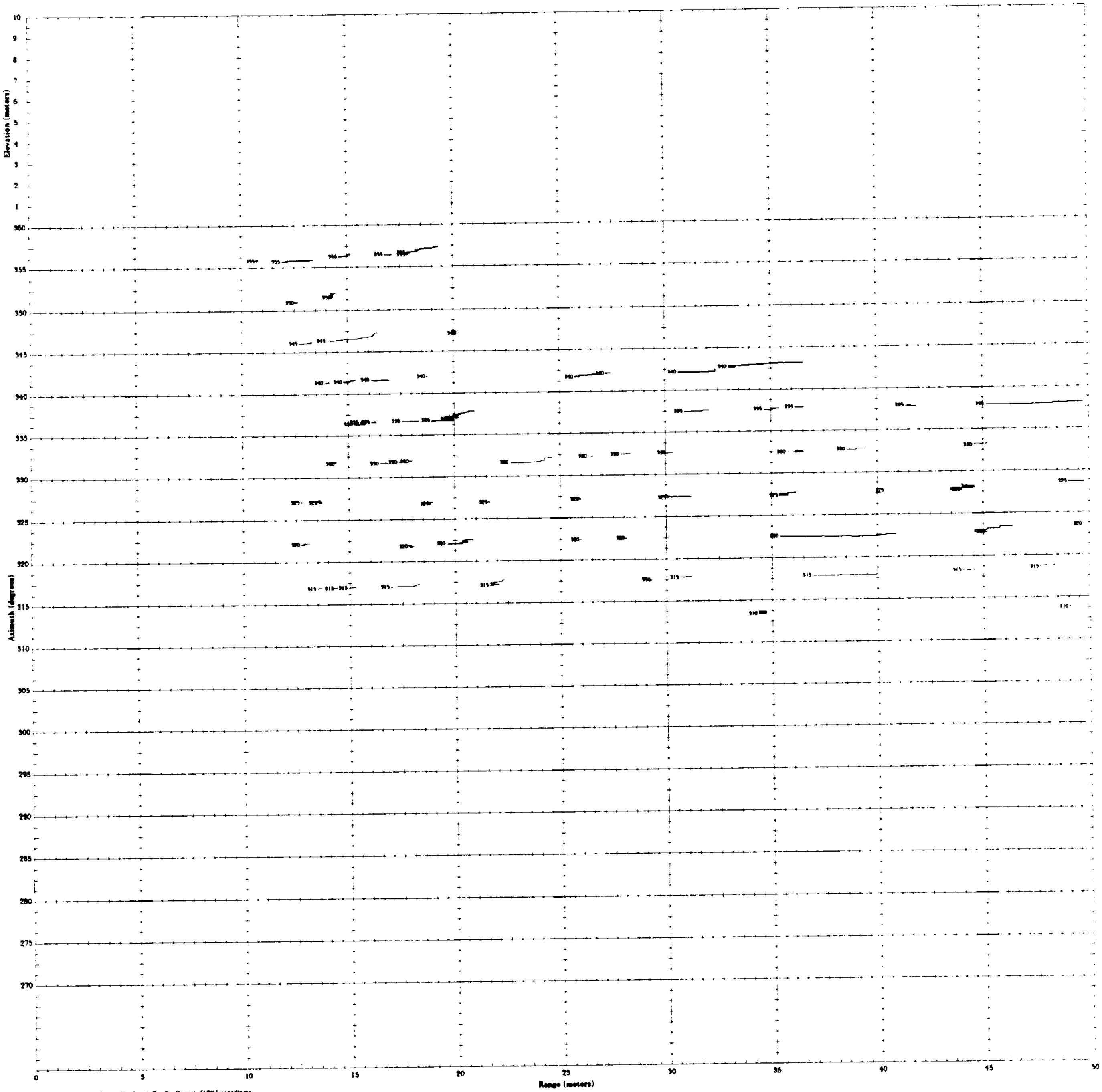
SCALE 1 : 1000 RANGE 0 TO 500 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Computer Department and the Artificial Intelligence Laboratory, Stanford University, from a data base generated at the Jet Propulsion Laboratory, under contracts [illegible] and JPL [illegible] and grant [illegible].

[illegible] MARCH [illegible]



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

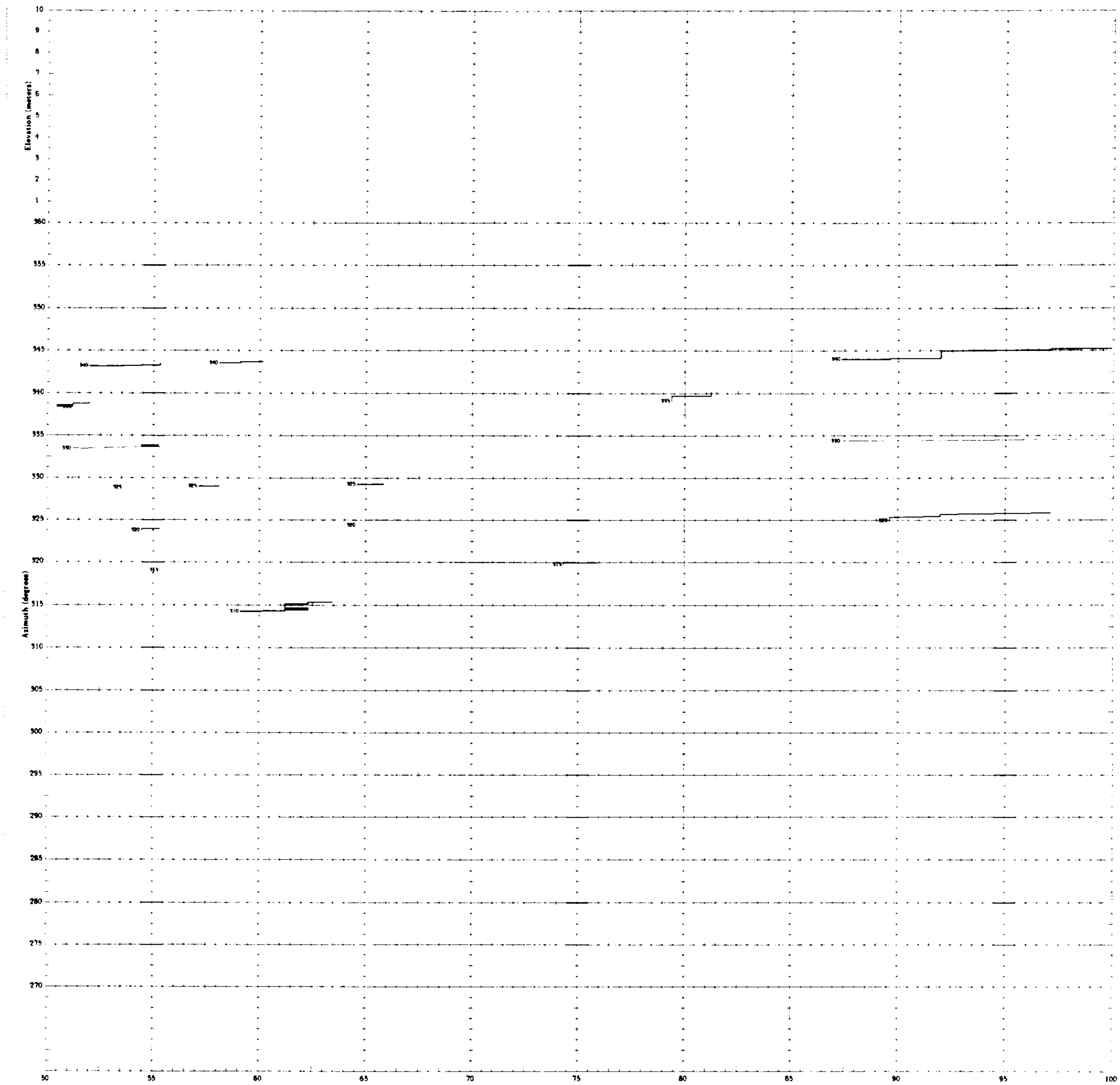
SCALE 1 : 100 RANGE 0 TO 50 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VPA
L2.RDSV.BACK	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249 and grant NSG 7138

061080/2315 MARCH 1980



Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

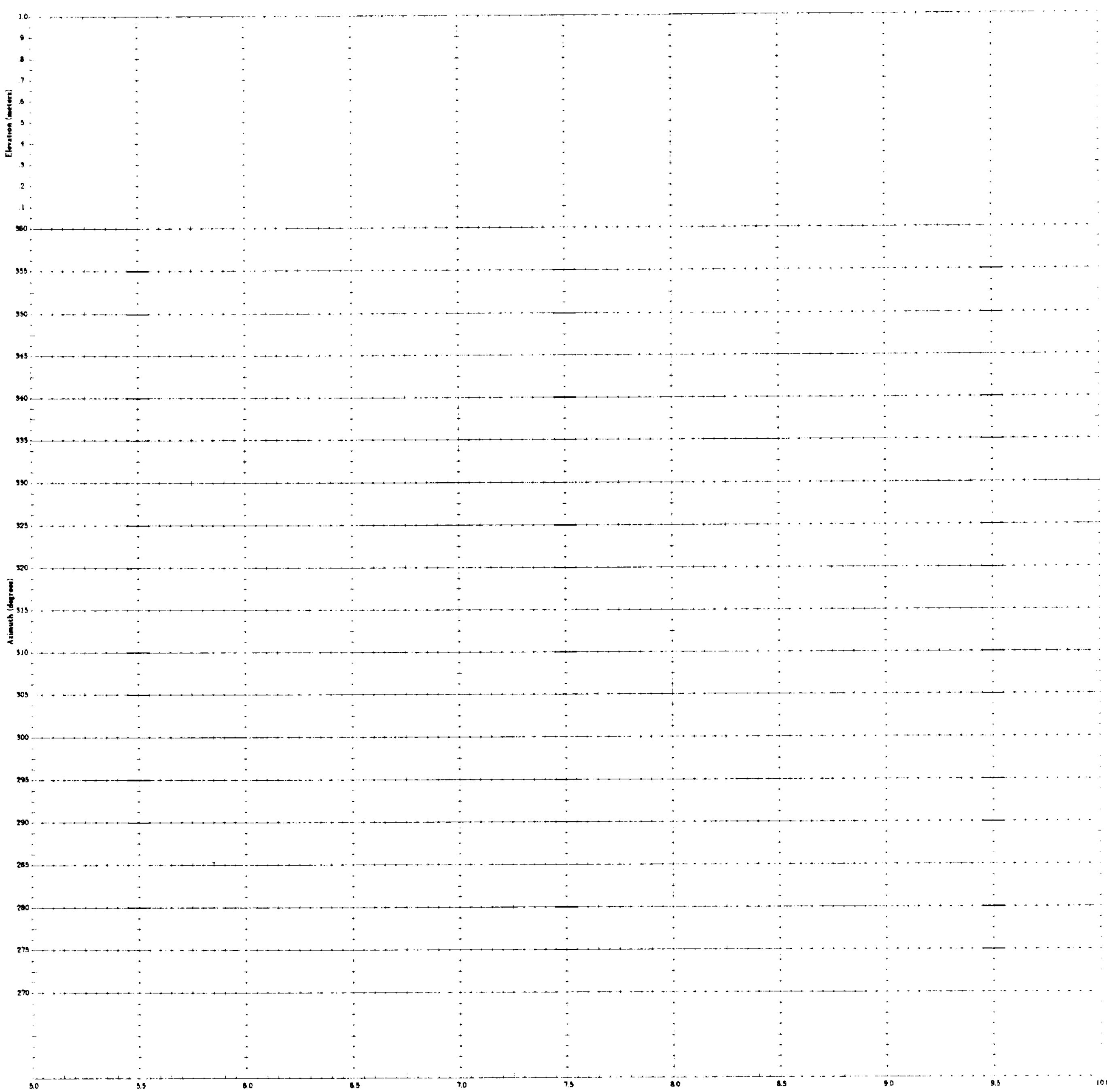
SCALE 1 : 100 RANGE 50 TO 100 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L2.ADSV.EOR.FRONT	L2VFA
L2.ADSV.BACK	L2VBP
L2.ADSV.EOR.BACK	L2VBA
L2.ADSV.FRONT.V	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955249, and grant NSG 7338

051 [illegible] MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

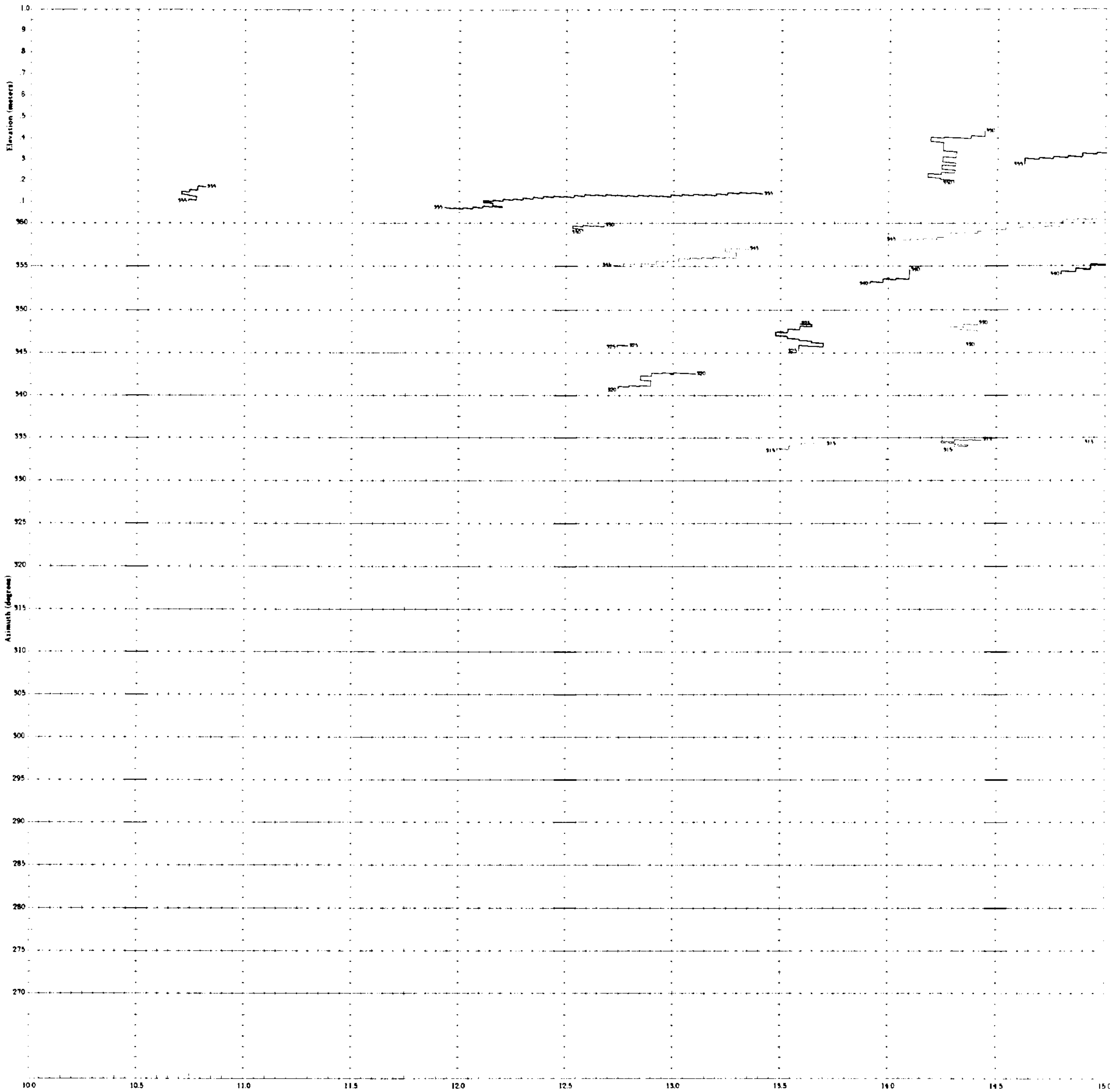
SCALE 1 : 10 RANGE 5 TO 10 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford:
L2.ADSY.EOR.FRONT	L2VFA
L2.ADSV.BACK	L2VBP
L2.ADSV.EOR.BACK	L2VBA
L2.ADSV.FRONT V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 955149, and grant NSG 7138

051980/2915 MARCH 1980



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VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 10 TO 15 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL	Stanford
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACK	L2VBF
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory, under contracts NAS1-9682 and JPL 955249, and grant NGL 7136.

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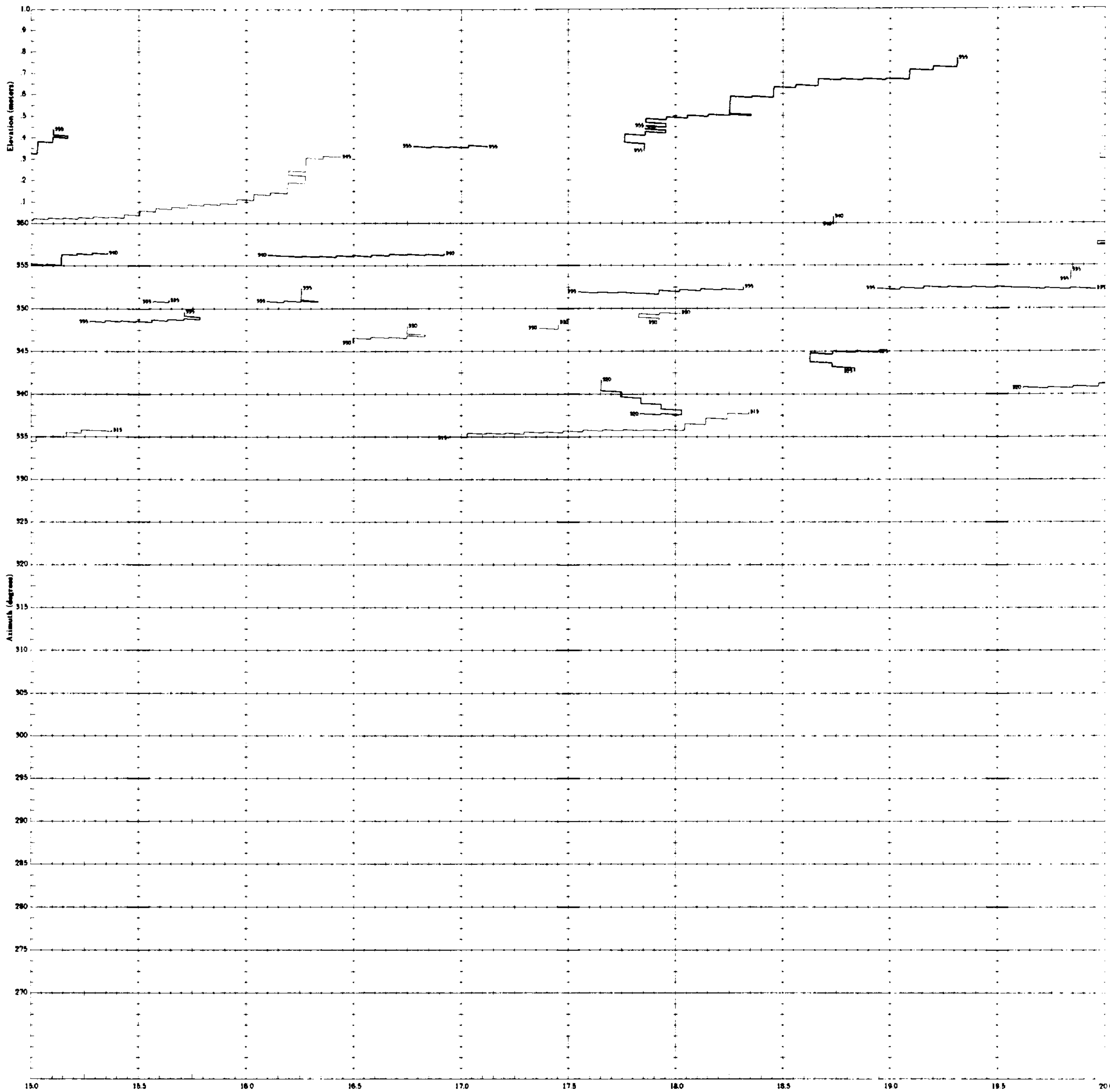

Plot parameters relate to the Local Gravity-Normal (LGN) coordinate system. The LGN system is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The Z-axis points toward the zenith. The Y-axis points in the direction of the projection of the LACS Z-axis normal to the horizontal plane through the origin. The plot abscissa (horizontal range) is the distance from the LGN Z-axis. The ordinate (elevation) is the value of the LGN Z-coordinate. The zero of elevation for each profile is labeled by the associated profile azimuth angle. Azimuth is measured clockwise from above, relative to a zero of reference along the LGN negative Y-axis.

VIKING LANDER 2

SYSTEMATIC VERTICAL PROFILES

SCALE 1 : 10 RANGE 15 TO 20 METERS 270 TO 360 DEGREES

Range Data Set Files

JPL:	Stanford:
L2.RDSV.EDR.FRONT	L2VFA
L2.RDSV.BACA	L2VBP
L2.RDSV.EDR.BACK	L2VBA
L2.RDSV.FRONT.V-	L2VFPR

These maps were produced by S. Liebes, utilizing resources of the Genetics Department and the Artificial Intelligence Laboratory, Stanford University (from a data base generated at the Jet Propulsion Laboratory), under contracts NAS1-9682 and JPL 953249, and grant NSG 7310.

0515000?515 MARCH 1980

8. GLOSSARY

CCW	Counter Clockwise
CW	Clockwise
IPL	Image Processing Laboratory, JPL
JPL	Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91103
LACS	Lander Aligned Coordinate System
LGN	Local Gravity-Normal coordinate system (equivalent to Lander Gravity-Normal System)
LMS	Local Mars coordinate System
RDS	Range Data Set (the fundamental Stereo System product)
RANGER	Stanford Stereo Station computer program (at IPL)
T^{SR}	Rotation Transformation matrix, from LACS ("R" Reference coordinate system) to LMS ("S")

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APPENDIX A

COORDINATE SYSTEMS AND LANDER ORIENTATION

A1 Lander Aligned Coordinate System (LACS)

Figure A1 schematically indicates the placement of the Viking lander cameras. The coordinate system shown in the figure is the Lander Aligned Coordinate System (LACS). The LACS was selected by mission management to be the lander prime reference coordinate system. The curious placement of the origin, not only outside of the lander but even below the nominal landing plane, apparently suited the convenience of engineers having lander/orbiter system integration responsibilities. The coordinate system employed for recording all range information within the RDSs is the LACS. This of course means that, since the landers are tilted, no value of coordinate remains fixed when tracing an elevation contour.

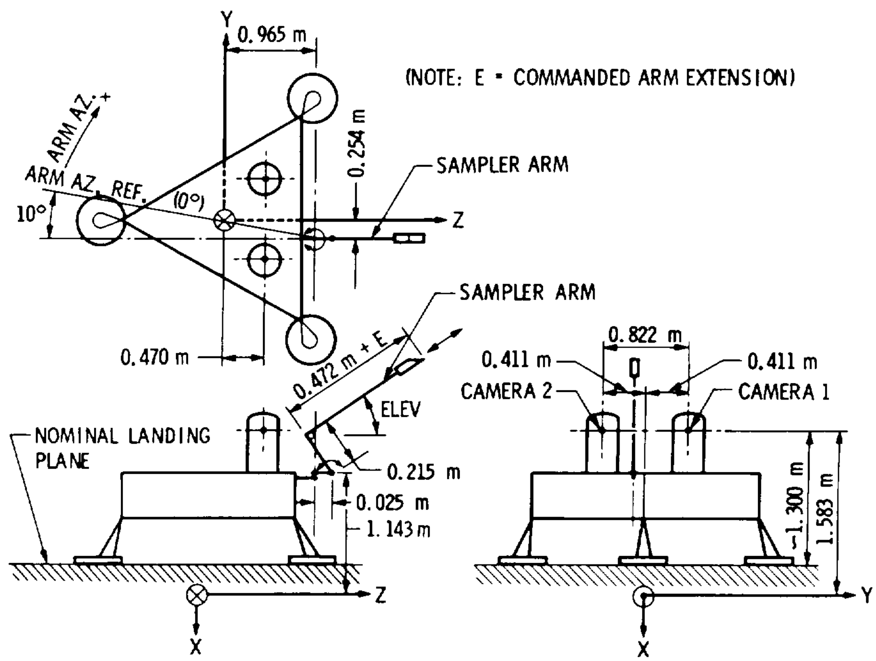

Fig. A1. Lander, camera, and LACS coordinate system configuration.

A2 Local Mars System (LMS)

For the purpose of supporting map generation, a coordinate system called the Local Mars System (LMS) was introduced within RANGER. This was not a unique system, but one that was variously defined according to the circumstances of the particular mapping operation. For the purpose of generating systematic elevation contour maps, the LMS was defined as follows. It was right-handed, the LMS z-axis pointed directly upward, toward the zenith, the LMS y-axis pointed toward the north, and the LMS x-axis pointed toward the east. The matrix within RANGER that defines the transformation from the LACS to the LMS is referred to as the T^{SR} (from "R", Reference LACS, to "S", LMS.) The values of the these transformation matrices for the two landers are given in sections 4.1 and 4.2 of the present appendix.

A3 Local Gravity-Normal System (LGN)

The borders of the few preliminary systematic maps plotted at JPL were aligned with the LMS; the cardinal compass directions were parallel to edges of these maps. However, since the cameras were located at equal elevations above the lander deck, they were directly or indirectly responsible for substantial mutual obscurations of the Martian surface. Furthermore, stereo ranging accuracy degenerates as the viewing directions approach a parallel to the intercamera baseline. These two factors contribute an inherent geometrical symmetry to the mapping characteristics relative to a plane passing perpendicular to the intercamera baseline through its midpoint. For this reason a coordinate system was introduced specifically for plotting the systematic elevation contour and vertical profile maps. This system is variously referred to as the Lander Gravity-Normal coordinate system (in early informal memoranda of A. A. Schwartz), and in this report as the Local Gravity-Normal (LGN) system. Though, formally, the LGN is defined in terms of the LACS, the system, in fact, may be obtained from the LMS by a rotation about the zenith. The LGN system is defined as follows: It is orthogonal and right-handed. The origin coincides with that of the Lander Aligned Coordinate System (LACS). The z-axis points toward the zenith. The y-axis points in the direction of the projection of the LACS z-axis normal to the horizontal plane through the origin. The transformation matrices from either LACS or LMS to LGN, and vice versa, may be obtained from the T^{SR} given in sections 4.1 and 4.2, below.

To the extent that lander tilt may be considered small, the LGN may be visualized as having its x-axis approximately anti-parallel to the LACS y-axis (and thus pointing roughly parallel to the direction from the "left-hand" camera, or camera number 1, toward the "right-hand" camera, or camera number 2.) The LGN y-axis points roughly parallel to the LACS z-axis, or in the horizontal direction outward and approximately forward from the lander, and roughly perpendicular to the intercamera baseline.

A4 Lander Orientation

The lander orientation information utilized in the preparation of the systematic maps, and represented by the T^{SR} matrices, was obtained from the inertial reference units onboard the landers. A comparison of lander performance with a computation of lander orientation based on output from the onboard guidance systems indicates that the standard deviation of the lander orientation paramters is $\pm 0.4°$ [Villyard, 1977; K. W. Villyard, private communication, 1981]. Independent evidence is consistent with the inertial reference unit data. The Viking 2 landing site is very flat. We do note that when the Stanford Stereo System is commanded to encircle the lander with a remote gravity-aligned elevation contour line, in the neighborhood of zero elevation, the contour line falls very closely upon the visual horizon. We furthermore note that the contour lines of the maps for Viking lander 2 hover very closely around zero elevation. Additionally, the orientation information obtained from the inertial reference units is consistent with rough independent checks performed by the lander imaging team [Mutch, 1976a].

The systematic map T^{SR} matrices for the two landers, as well as the lander orientation parameters derived from these matrices are indicated in the sections below.

A4.1 Lander 1

The systematic map T^{SR} matrix for Viking lander 1 is

$$T^{SR} = \begin{pmatrix} +.0503457 & +.7858010 & +.6164240 \\ -.0136545 & +.6176890 & -.7862990 \\ -.9986370 & +.0311701 & +.0418279 \end{pmatrix}.$$

The orientation angles obtained from the lander 1 T^{SR} are shown below. The large number of significant figures is shown only for compatibility with the T^{SR}. As noted in above, the standard deviatation error in tilt and orientation of the lander relative to north is estimated to be $\pm 0.4°$ (Note: When viewing normal to the deck of the lander, the LACS negative z-axis coincides with the projection of leg number 1, the aft pointing leg.):

North: 38.09489° cw from leg 1.
Tilt magnitude: 2.991820°
Tilt azimuth (downslope): 323.2693° cw from leg 1.

Alternatively,

North is 141.90511° ccw about the LGN z-axis, from the LGN y-axis.
Deck tilted downward 2.991820° at azimuth 285.1744° cw from north (LMS y-axis).

A4.2 Lander 2

The systematic map T^{SR} matrix for Viking lander 2 is

$$T^{SR} = \begin{pmatrix} +.1414660 & -.8623340 & +.4861690 \\ -.0191174 & +.4886360 & +.8722730 \\ -.9897580 & -.1326930 & +.0526407 \end{pmatrix}.$$

The following orientation parameters may be obtained from the T^{SR} matrix for lander 2 (Note: When viewing normal to the deck of the lander, the LACS negative z-axis coincides with the projection of leg number 1, the aft pointing leg.):

North: 150.8665° cw from leg 1.
Tilt magnitude: 8.207321°
Tilt azimuth (downward): 68.56271° cw from leg 1.

Alternatively,

North is 29.1335° ccw about the LGN z-axis, from the LGN y-axis.
Deck tilted downward 8.207321° at azimuth 277.6962° cw from north (LMS y-axis).

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APPENDIX B

SELF-OBSCURATION OF MARS BY THE LANDER

B1 Self-Obscuration

Had the policy in lander design been exclusively to satisfy the interests of the lander imaging team, much more of the landing site would have been visible to the cameras. In reality, there were of course many competing engineering and scientific interests that had to be considered in configuring the lander. It will be recalled, from figure A1, that the two cameras were jointly placed closest to the side of the lander on which the surface sampler arm assembly was mounted. This was to enable the cameras to support surface sampler activity. This side of the lander side was referred to as the front. The extent to which the final configuration of the lander and the placement of the cameras thereon influenced the visibility of the landing site to the cameras is indicated in the "Skyline Drawings" of figure B1. The top half of the figure indicates the view from camera 1, the "left-hand" camera, and bottom half that from camera 2, the "right-hand" camera. The figure indicate the fields of view of each of the cameras, from 40° above the horizon to 60° below, through 360° of azimuth. The nominal horizon is located along the fiducial line just above center in each half of the figure. The canister-like structure at the azimuthal extreme in each of the views is the other camera.

The figure indicates the appearance of the various pieces of lander hardware as well that of a rectangular grid on the nominal landing plane in front of the lander. The front of the lander is in the right half of the camera 1 drawing and in the left half of that for camera 2. It is evident from these figures that not much solid angle of the nominal Martian landing plane can be seen behind the lander. In order perform stereophotogrammetry of the Martian surface, it is of course necessary for the surface to be visible to both of the cameras. (There were at least two mirrors on the lander, but the author is not aware that any significant attempts were made to do perform stereophotogrammetry by pairing real and virtual images.) A careful inspection of the skyline drawings, with the aid of the grid on the nominal landing plane, will indicate that substantial portions of the near field in front of the lander are obstructed from the joint view of the cameras.

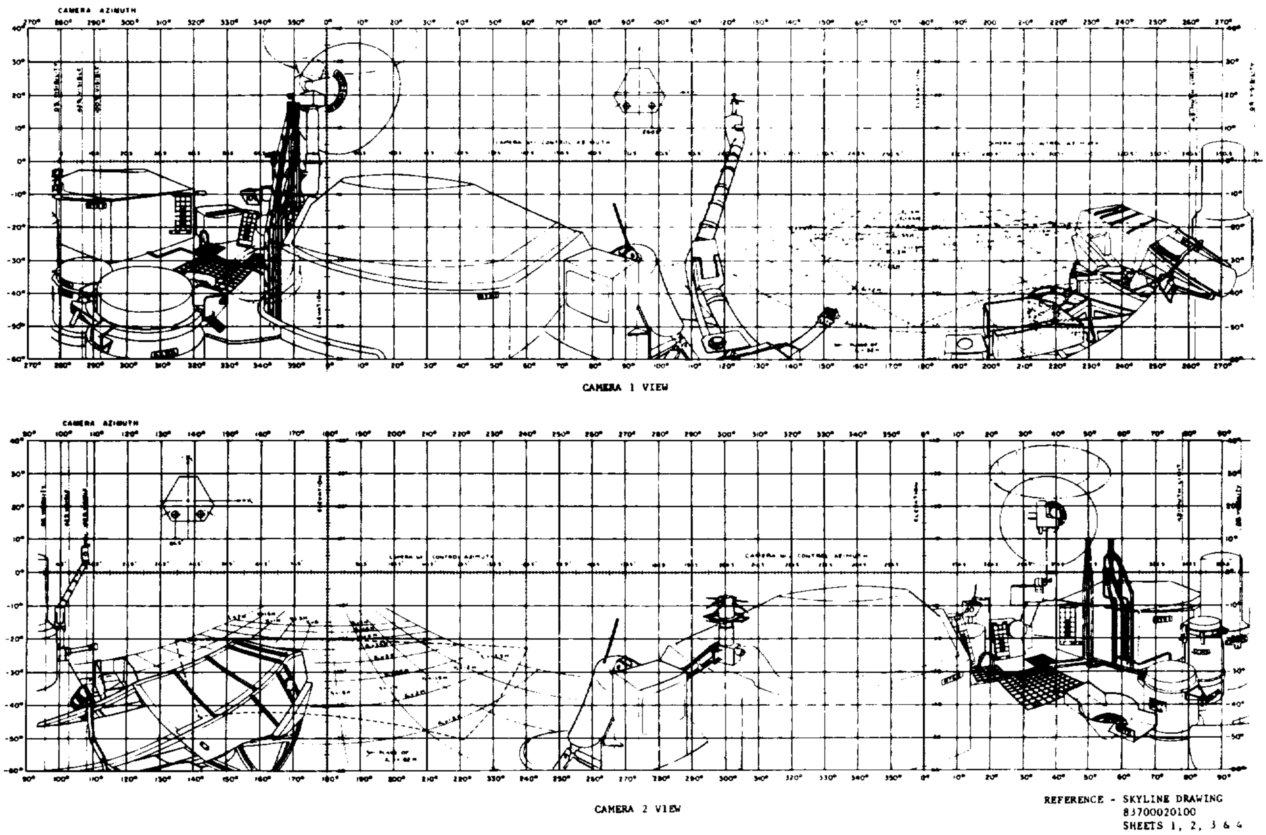

Fig. B1. Skyline Drawings.

APPENDIX C
MAP GENERATION SYSTEM AND PRODUCTS

C1 Ranging and Mapping System

For further details than contained in this report regarding the Stanford Stereo Station and the most commonly utilized features of the program RANGER, the reader is referred to earlier work [Liebes, 1977]. Additional information regarding the program RANGER resides in unpublished documents of JPL's Image Processing Laboratory.

C2 Map Product Types

The present report is concerned with the sets of systematic elevation contour and vertical profile maps that have been produced for the two Viking landing sites. During the mission other types of map products were produced. No systematic distribution of the remainder of the map products has either been undertaken or is planned. The bulk of the these other products were generated in support of the sampler arm activity during the mission. This activity primarily involved soil sample acquisition for delivery to onboard experimental laboratories, and material manipulation in support of physical properties experiments. The map products generated for this support were in the form of arm-specific "vertical" (relative to the lander) profiles. The format of these products has been previously described [Liebes, 1977]. These products, along with photographs of the arm-specific vertical profiles overlayed on unrectified stereo images pairs of the subject surface region were delivered to members of the individual Viking lander science teams, to members of the sampler arm team, and to management during the mission. There has been no other distribution. Miscellaneous other products have been generated. Listed below is a summary of the types of range data set products have been generated:

1. Systematic contour map data (intersections with Mars of planes oriented perpendicular to the local Mars zenith), extending from the immediate foreground to the remote limits of ranging capability, in excess of 100 m range, for the front and back of both landers. Half-size versions of all of these products are contained in the present report.

2. Systematic vertical profiles (intersections with Mars of planes radiating out from the lander and containing the local Mars zenith), at 5°-azimuth intervals, from the immediate foreground to the remote limits of ranging capability, for the front and back of both landers. Half-size versions of all of these products are contained in the present report.

3. An orthographic projection of ridge and trough center lines for the front of lander 1. This information was used to aid in the preparation of a geological map of the Viking 1 landing site [Binder, 1977] (a drafting error resulted in the labeling of a scale bar in figure 5 of that report as 10 m in length, instead of the correct value of 20 m).

4. An asystematic contour mapping of a drift field in the left front of lander 1. This data has been published [Mutch, 1976b].

5. Numerous detailed sampler-arm-specific lander aligned "vertical profiles" (intersections with Mars of planes perpendicular to the lander deck and radiating out at various arm azimuth angles from the vertical pivot axis of the sampler arm) as required to support sample acquisitions, "rock-rollings," trenching operations, and site disturbance analysis during the active part of the mission. Much of the mission support sampler-arm-specific stereophotogrammetry was performed by Ray Jordan of the U.S. Geological Survey, Flagstaff, AZ. The format of these profile maps, and examples of the products have been reported [Liebes, 1977].

6. Detailed vertical profile and contour map data of selected "rock-roll" candidates. The profiles were identical to those referenced in 5., above. An example of a detailed profiling of a "rock-rolling" candidate has been published [Moore, 1978].

C3 RDS File Names

The file names for all of the RDSs used in generating the contour and vertical profile maps for both landers are indicated below. As mentioned in sect. 3.3 of this report, the differences in computer types at the two institutions necessitated different formats for the names. Operational procedures lead, as a rule, to the division of the RDSs into pairs for the front and again for the back of each lander. The lander 2 contour set is an exception, in having three sets in front.

C3.1 Viking Lander 1

C3.1.1 Lander 1 Systematic Elevation Contour RDS File Names

Stanford University	Jet Propulsion Lab.
L1CFP.DAT[CON,VL1]	L1.RDSC.FRONT.VT1025
L1CFA.DAT[CON,VL1]	L1.RDSC.EDR.FRONT
L1CBP.DAT[CON,VL1]	L1.RDSC.BACK
L1CBA.DAT[CON,VL1]	L1.RDSC.EDR.BACK

C3.1.2 Lander 1 Systematic Vertical Profile RDS File Names

Stanford University	Jet Propulsion Lab.
L1VFP.DAT[PRO,VL1]	L1.RDSV.FRONT3
L1VFA.DAT[PRO,VL1]	L1.RDSV.EDR.FRONT
L1VBP.DAT[PRO,VL1]	L1.RDSV.BACK
L1VBA.DAT[PRO,VL1]	L1.RDSV.EDR.BACK

C3.2 Viking Lander 2

C3.2.1 Lander 2 Systematic Elevation Contour RDS File Names

Stanford University	Jet Propulsion Lab.
L2CFP.DAT[CON,VL2]	L2.RDSC.FRONT
L2CFP2.DAT[CON,VL2]	L2.RDSC.FRONT2
L2CFA.DAT[CON,VL2]	L2.RDSC.EDR.FRONT
L2CBP.DAT[CON,VL2]	L2.RDSC.BACK
L2CBA.DAT[CON,VL2]	L2.RDSC.EDR.BACK

C3.2.2 Lander 2 Systematic Vertical Profile RDS File Names

Stanford University	Jet Propulsion Lab.
L2VBP.DAT[PRO,VL2]	L2.RDSV.BACK
L2VBA.DAT[PRO,VL2]	L2.RDSV.EDR.BACK
L2VFA.DAT[PRO,VL2]	L2.RDSV.EDR.FRONT
L2VFPR.DAT[PRO,VL2]	L2.RDSV.FRONT.V70104

C4 Map Plotter

All of the maps were formatted and produced by computer. The output device was a Varian Statos 4222 electrostatic printer/plotter, with 4224 styli spaced at 0.005 inch intervals over a 21.12 inch writing width.

APPENDIX D
STEREO SYSTEM RANGING ACCURACY

D1 Ranging Accuracy

The ranging accuracy of the stereophotogrammetry system applied to the Viking lander camera images has been previously discussed [Liebes, 1977]. A plot of the theoretical point ranging error as a function of range is reproduced, from this reference, in figure D1. The error curves are plotted for three different values of azimuth, relative to a 0° reference direction perpendicular to the intercamera baseline. The plots are made for 0.04° resolution imagery data that characterizing the high resolution mode employed in creating the mosaics used in producing the systematic maps.

The error curves have been constructed as follows. Consider a plan view of the stereo camera system, such as indicated schematically in figure A1 (a). Imagine there to be associated with a given field point a pair of wedges radiating out from the cameras, each of apex angle equal to the angular resolution of the cameras, and crossing at the field point to form a diamondlike zone of intersection. Roughly speaking, a field point located anywhere within this overlap zone will be be recorded at the same fixed pixel locations in the two images. The diamond therefore indicates the zone of uncertainty for the range. For the purpose of the plot, the range uncertainty is taken to be the length of the diamond in the direction away from the lander. This is a conservative figure from the point of view of an ideal system, since a) the extreme variabilty of range relative to a central point in the diamond is only half this magnitude, and b) the shape of the diamond will render the rms error even smaller than this. However, there are uncertainties regarding the true pointing directions of the cameras. These reflect prelaunch calibration determinations [Wolf, 1981], nonlinearities in the cameras, settling of the lander and diurnal thermal warp of the hardware, etc. Furthermore, the budget for generating the map data corresponded to a commitment of a certain amount of mapping time. A compromise had to be struck between the conflicting desires for density of mapping coverage and accuracy of the product. It is judged that that the uncertainties shown in the figure, are a reasonable measure of the absolute accuracy of the map data. Local relative potential accuracy of the system is estimated to be roughly an order of magnitude better than that plotted in the figure.

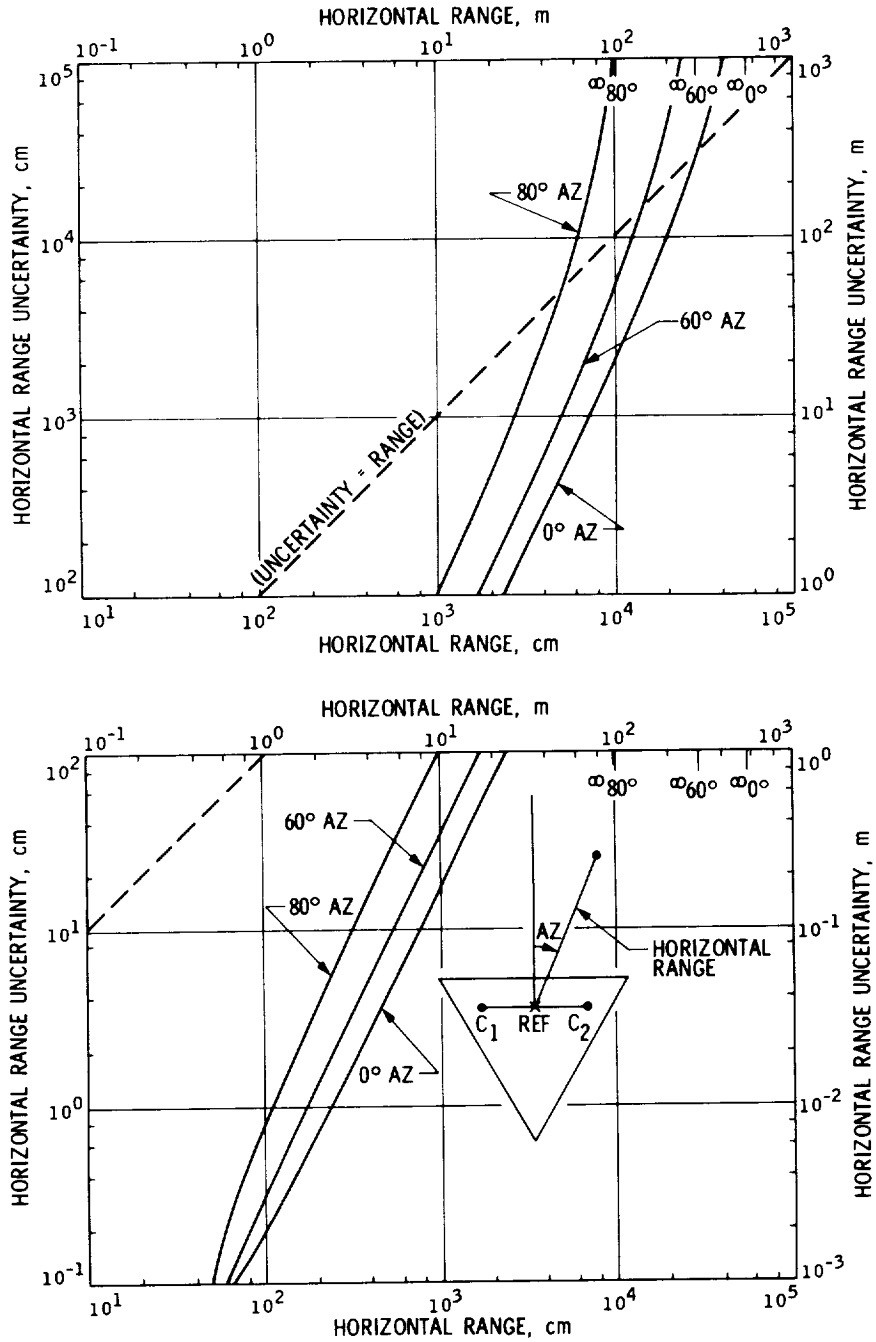

Fig. D1. Ranging Accuracy as a Function of Range.

APPENDIX E
RAGGEDNESS AND DISTORTION

E1. Jaggies and Irregularities

We have described in section 2.1 the principle of operation of the stereo mapping system. The contours/profiles were generated by manually commanding a 3-D overlay cursor to follow the perceived intersection of the appropriate mathematical surface of constraint with the Martian relief. The hand-input device for performing cursor control was a trackball. This device consists of a baseball-sized sphere, roughly the top third of which protrudes through a hole in the top of a box. Inside of the box, the ball rests upon a pair of orthogonally orientated angular encoders, the positions of which may be read by the computer. One may freely define the parameterization between trackball angular position and the location of the 3-D cursor on the surface of constraint in the Martian model. The parameterization adopted was approximately the following. Lateral motions of the ball were translated linearly to angular displacements of the 3-D cursor about the LGN z-axis, i.e. the zenithal direction through the lander. Rotation of the top surface of the ball away from or toward the operator was translated into nonlinear variation of the range of the cursor from the lander. Specifically, the range parameterization established a linear relation between angular displacement of the trackball and variation of the convergence angle from the two cameras to the field point. This parameterization was selected to enable the operator to move to remote field points without having to make an inordinate number of rotations of the trackball. The parameterization was also qualititatively consistent with the degredation of ranging resolution with range.

This selection of parameterization resulted in the introduction of an unanticipated artifact in the maps. Before explaining this, we make several introductory comments, dealing first with an aspect of mammilian, and in particular human, stereo performance. Humans use a variety of clues other than stereoscopic in judging the absolute and relative range of objects and features. Among these are convergence, foreshortening, diminution, shadow, shading, contrast, inference from familiar kinds of features, and the like. The author personally performed all of the stereophotogrammetry represented by the maps of this report. It was not an uncommon experience, while generating contour/profile lines, for him to experience a lag in awareness that the 3-D cursor had been carried from a region where stereo data existed into a region where, as a result of obscuration to one camera, only monoscopic data existed. These transgressions were invariably discovered after a few pixels of trespass into forbidden territory. Under such a circumstance, it would be necessary to edit out the faulty data from the range data set; a convenient means was provided for doing this. The point is that the nonstereoscopic clues to depth can be very strong, and even though there may be a degree of qualitative validity to the relative range determinations, there intentional use was out of order in the context of the present work.

The reader may have noted that when looking at an outdoor scene, there is no conspicuous range at which one has a sense that one's stereo perception is breaking down and other clues to depth are becoming dominant. Such was also the author's experience in mapping remote features, where the convergence angle began to approach the resolution of the cameras. Under such circumstances, one often had a distinct sense of local depth variation from other than stereoscopic clues; e.g. if a rock were being examined, brightness and shadow variations were powerful cues.

We have remarked that the cameras were point scanning devices, and that the data radioed back to earth consisted of distinct brightness values for a raster of digitized points in the scene. These individual digitized points were resolved on the video screen. Now, it was also true that the two component points of light, overlayed on the images on the video monitors to generate the 3-D cursor were written to a one-bit raster corresponding 1:1 to the raster locations of the displayed image points. This lead to a frustrating appearance of the 3-D cursor stitching back and forth in depth through the relief as the cursor was carried across the scene. It seems that the human being is able to establish an average range for micro-facets of extended textured objects to greater precision than the point ranging accuracy associated with the resolution of the cameras and display. Thus, there was the inherent capability of the human operator to place the cursor more accurately in local average depth than the system would permit.

The trackball had an inherent angular resolution, corresponding to the quantized angular rotational increment required to generate an output pulse. RANGER recorded and calculated range changes at the resolution of the trackball. In addition to a compiled-in trackball parameterization, there was a commandable scale factor controlling the sensititvity of displacements in 3-space to the rotational sensitivity of the trackball. A qualitative attempt was made to maintain the the relationship between the quantized reading sensitivity of the trackball, corresponding 1:1 with the detail of the map data, a bit finer than the ranging resolution associated with the display raster. This enabled interpolation of range to finer detail than theoretical point ranging accuracy. The trackball and ranging sensitivity is evidenced in the plots of the map data by the mutually orthogonal elemental line segments, or "jaggies" in the lines.

Enough for the introductory remarks. The map data was generated and plotted out to ranges where the ranging error was substantial. The outer mapping limits were generally well beyond the range where cosmetic considerations alone might dictate calling it quits. The reason for working this far out was to milk the data for all it was worth. It was appreciated that the audience for these maps would be sophisticated. We were anxious to capture whatever information we were able to, consistent with the resources commited to the task. As there is no post editing, detectible smoothing, or other form of cosmetizing applied to the data, indications of degradation, such as size of the jaggies, are evident to the investigator. He can do his own discounting.

Consider the case where we are trying to map a feature, the extent of which in the range direction is small compared to the ranging resolution of the 1-bit raster-limited 3-D cursor. We have explained above that the trackball was read to finer granularity than that corresponding to a displacement of the displayed 3-D cursor. This, in effect, enabled us to interpolate the data in order to capitalize on the ability of the human to locally average over an extended textured feature. The products support the merit of this practise, in that range noise on contour lines running over smooth but textured surfaces was generally less than point ranging accuracy would have lead one to expect. Additionaly, adjacent lines in elevation on such surfaces, which should not cross unless the surface is vertical or overhanging, did not generally cross as much as one would expect on the basis of point ranging accuracy.

Now, here is the nub. Consider the the cursor to be resting as closely as it can be visually placed upon a remote rock. As the cursor is drawn across the face of the rock in order to generate a contour or profile line, one has a distinct, and to a significant extent meaningful, sense of range variation. However, the inherent limitations of the 1-bit graphics raster display precluded subpicture element visual feedback as the cursor is played over the small perceived variations in depth. One's instinct in moving the cursor over the contour of e.g. an apparently roughly spherical rock is to rotate the trackball through approximately the same range in lateral as in longitudinal angle. For these small rotations there is not sufficient variation in range for the differential disparity of the left and right components of the cursor to register on the display as a jump in depth. However, the motion of the tackball was recorded and subsequently displayed on the maps. Now, given the nature of the parameterization of the trackball, at relatively great range equal lateral and longitudinal rotations of the trackball lead to much greater jumps in range than in lateral 3-space displacement. As there was either no or insufficient visual feedback clues to alert the photogrammetrist to the degree of the problem, it was difficult to compensate satisfactorily in the blind. Furthermore, the photogrammetry was conducted at the JPL, and the vast bulk of the map products were not plotted until we brought the data back to Stanford University, well after the photogrammetry was completed. Thus, we were not greatly sensitized to the degree of the effect during the data generation period. The artifacts are evident in the tendency for the contour and profile lines to tend to be excessively v-shaped toward the lander for the relatively more remote features.

This leads to ambiguity in judging just what part of a contour or profile line on a remote feature most accurately represents the range of the feature. If an isolated remote rock were to be contoured, it is likely that the first point of contact with the rock was the most accurate indication of its range. However, it is not possible, in looking at the map data to determine this point. In some instances the cursor might have been carried to the near nose of the rock, in "no-draw" mode, then moved back along the side in no-draw mode, via a judgement call on the range change; then the contour could be swept across the face. In this instance, the range of the nose would tend to be the most accurate value for the rock. If, however, the cursor were initially placed to the side of the rock in no-draw mode, and then the contour traced, the measure at the side of the rock would tend to be the more valid. There is no way to know which method was employed in any given situation.

Had the magnitude of this effect become evident to us sooner, we likely would have introduced an interactive means for calling into play, as necessary, a 1:1 parametric relationship between 3-D displacement and trackball rotation.

We might also note that one approach to improving the resolution of the 3-D cursor, and the overlay contour/elevation graphics as well, would be to introduce a spatially extended multi-bit gray-level graphics supporting interpolation between raster elements.

Rather than progress further into finer points of detail, it is perhaps best to let the matter rest with a warning to the reader to interpret clearly noisy data with care.

APPENDIX F
DATA AVAILABILITY

F1. General Lander Image Products

The NASA Contactor Report on "The Mosaics of Mars" [Levinthal, 1980] provides detailed references and suggestions for accessing the diverse Viking lander camera related data products.

F2. Systematic Maps Products

F2.1 Systematic Maps and Mosaic Overlays

Individual copies of the true-scale versions of the maps, as well as copies of the mosaic overlays, contained in this report may be obtained from the sources indicated below. In the case of Viking lander 1, reference should be made to data number NSSDC ID 75-075C-06T, and in the case of Viking lander 2 to NSSDC ID 75-083C-06T.

Researchers within the United States should contact:

The National Space Science Data Center
Code 601.4
Goddard Space Flight Center
Greenbelt, Maryland 20771

Researchers outside the United States should contact:

World Data Center A
Rockets and Sattelites
Code 601
Goddard Space Flight Center
Greenbelt, Maryland 20771

F2.2 Range Data Sets

The Range Data Sets are stored on magnetic tape. There are a total of 9 nine-track/800 BPI tapes for for elevation contour and vertical profile RDSs. There are additionaly 18 nine-track/800 BPI magnetic tapes of arm-specific and miscellaneous RDSs. RDSs are not available from the National Science Data Center. They are stored at the following locations:

Image Processing Laboratory
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91103

Regional Planetary Image Facility
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91103

Additionaly, individual members of the Viking Lander Imaging Team have have received copies of these tapes. For the names and addresses of these recipients, refer to [Levinthal, 1980].

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16. Abstract

The 1976 Viking mission to Mars placed two identical landers on the surface of the planet. This Atlas contains half-size reproductions of the complete set of true-scale systematic map products that have been generated for the two Mars Viking landing sites from stereo pairs of images radioed to Earth from the landers. The maps cover from the immediate foreground to the remote limits of ranging capability, several hundred meters from the landers. The maps are of two kinds: 1) elevation contour, and 2) vertical profile.

The Atlas includes background and explanatory material important for understanding and utilizing the maps. The collection consists of nearly 200 individual sheets, spanning eleven different scales from 1:1 to 1:2000. The Atlas includes an extensive set of both single and stereo mosaic images into which the contour and vertical profile data have been inlayed.

The half-size collection is complementary to the true-scale map sheets that are individually available on special order. It is believed that most requirements can be satisfied by this reduced scale collection.

17. Key Words (Suggested by Author(s))		18. Distribution Statement
Mars	Cartography	Unclassified-Unlimited
Viking	Stereophotogrammetry	STAR Category - 91
Lander	Photogrammetry	
Atlas	Stereo	
Maps		

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
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